

# MODERN Machine Shop

June, 1950



**NO HOKUM**  
*with* **BOKUM**



**ALL THREE** styles of Bokum Boring Tools have combined helical and spiral relief that give these advantages over ordinary boring tools:

- constant clearance throughout life of tool.
- shape of cross section remains constant.
- easy resharpening by grinding top face only.
- available in wide range of sizes,  $\frac{1}{16}$ " and up.

*Ask for any of these catalogs*

B 1139-6 for super high steel  
B A398 for carbide-tipped tools  
B 948 for solid tungsten carbide  
B-AB-1  
B-AB-4-12 for resharpening fixtures  
B-483 for appropriate tool holders



**BOKUM TOOL CO.**

14775 WILDEMERE AVE. · DETROIT 21, MICH.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS



Nov. 6, 1908  
First Heald  
Internal shipped  
(Model No. 70)



Feb. 28, 1950  
Latest Heald  
Internal shipped  
(Model No. 171)

PACKING LIST..... MACHINE..... DATE.....  
 TRAVELER UNIT SHEET.....  
 SHEET NO. 1  
 DATE ISSUED 12/22/49  
 PROP. NO. 32704  
 SERIAL NO. 30707  
 R-3137

**NAME ON REQUEST**

THE HEALD MACHINE COMPANY, WORCESTER, MASS.

## forty-two years of repeat orders

from one automobile manufacturer!

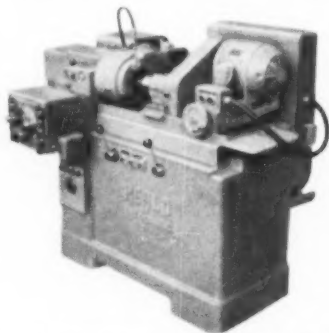
...a typical example of how  
a Heald machine is its own best salesman

Practically all Heald customers have one thing in common. They keep coming back for more Heald machines—again, and again, and again!

Why? Because they know—from their own experience—just what these time-saving, money-saving machines can really do. They have seen them put through their paces, day after day, on their own production lines. And they know, too, that they can always depend on Heald engineers for friendly, helpful service in solving their precision finishing problems.

The result—repeat orders that are the backbone of our business.

Remember—when it comes to precision finishing, it pays to come to Heald.



This Heald Model 171 internal grinder is a far cry from the Model 70 machine originally shipped to this manufacturer 42 years ago. For Heald engineering has continually kept pace with industry's growing demands for faster production, higher precision, greater accuracy and lower operating and maintenance costs.

**THE HEALD MACHINE COMPANY**  
WORCESTER 6, MASSACHUSETTS



Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York



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GARDNER PUBLICATIONS, Inc.  
431 Main St., Cincinnati 2, Ohio

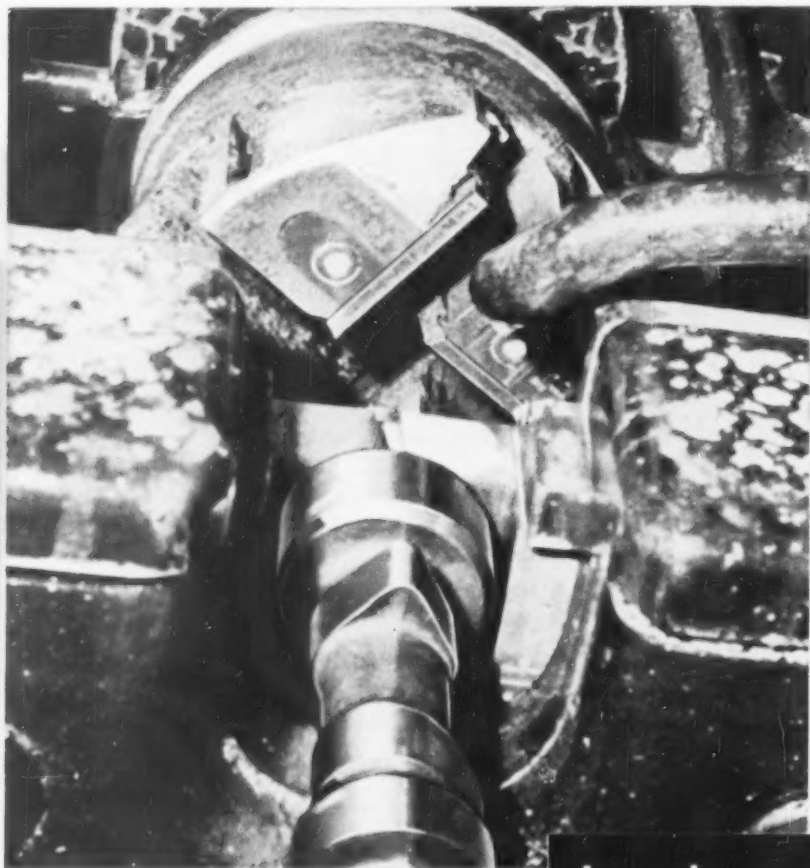
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Acceptance under Section 34.64,  
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• The Packard Motor Car Co. is another automobile manufacturer using Landis Threading Equipment. Here, threads are cut on main shaft ends with a Landmaco Leadscrew Machine equipped with Lanco Hardened and Ground Die Head. A 1" 14 pitch  $\frac{3}{8}$ " long thread is cut at the rate of 150 pieces per hour, floor-to-floor time. Landmaco Machines are well chosen for these mass production operations. They cut accurate threads at high production rates, yet keep production costs low by virtually eliminating "down" time.

Write for Bulletin M-75

**LANDIS Machine CO.**

WAYNESBORO • PENNSYLVANIA • U. S. A.

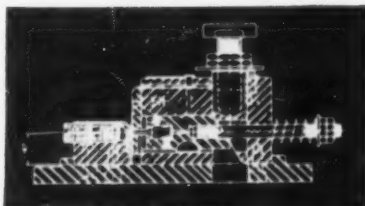
**Landmaco**  
LEADSCREW  
MACHINES  
used by  
**PACKARD**

HOLES PIERCED AT 90° ANGLE...

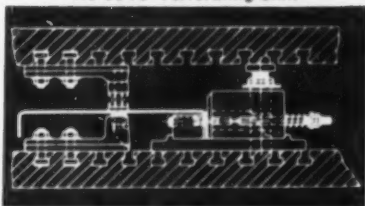


Extruded shapes, ells, angles and other molded, shaped or fabricated pieces are easily pierced from the side at 90° with HU-50 Perforating Units. Quickly set up and adjustable, these units may be used separately or with standard perforating equipment. The advantages provided by other Whistler Adjustable Dies are retained. Absolute accuracy is assured. Quick change-over of hole arrangements can be made... in many cases, on the press. Production economies and speeded up operating schedules are effected. Continued re-use of units in different groupings spreads initial cost. It makes sense to look into the use of Whistler Adjustable Dies for all perforating, notching, slitting or rounding operations.

First Public Showing of Whistler Magnetic Dies at Work—Booth 832—ASTE Convention—April 10-14—Philadelphia



Detailed drawing showing operation of HU-50 90° Perforating Unit.



Typical set-up shows 90° perforating unit operated in conjunction with standard perforating equipment.

**DETAILS  
EXPLAINED IN  
CATALOG NO. 48**

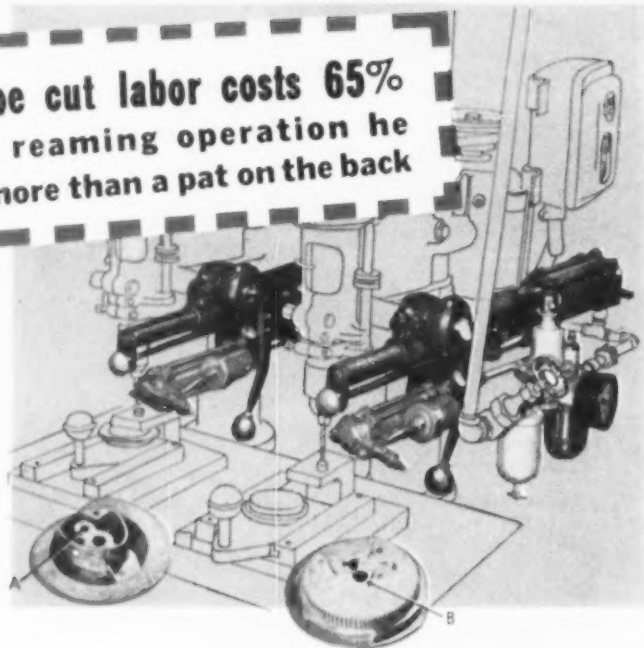
Get the facts about this 90° perforating unit in a hurry. Your copy of this catalog will be sent at once upon request.



**S. B. WHISTLER  
& SONS, Inc.**

740 Military Road • Buffalo 17, N. Y.

**When Joe cut labor costs 65%  
on this reaming operation he  
earned more than a pat on the back**



**THE JOB:** Finish ream two holes in a zinc record changer part. Hole "A" on one side of the part, hole "B" on the reverse side.

**JOE'S SOLUTION:** He equipped two 14" drill presses with Bellows "Controlled-Air-Power" Feeds and Hydro-Checks; installed a two-position fixture (load and unload in the front position, ream in the back position.)

**LIKE TO  
KNOW HOW  
JOE DID  
IT?**



**THE RESULT:** Labor costs cut 65%.

That's what alert production men like about Bellows "Controlled-Air-Power" Devices. They spark imagination; set the old creative bug working; give an engineer ideas . . . and, equally important, help him put them to practical, profitable use.

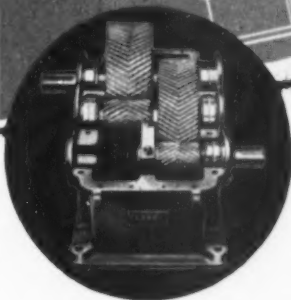
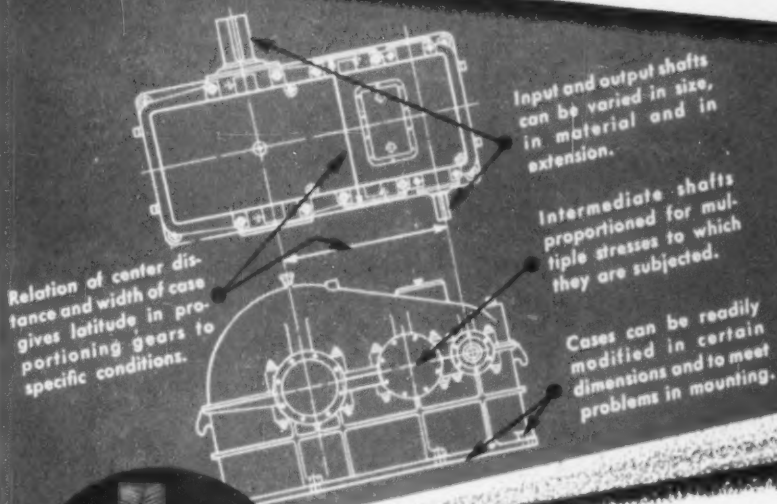
Bellows "Controlled-Air-Power" Devices (air motors, air-powered work and tool feeds, air-operated rotary feed tables, air-powered work holding and clamping units) convert standard hand-operated machine tools to automatic units, make tool-room built special purpose machines practical and inexpensive even for short runs.

Write for Foto Facts File 46-396. We'll send it, without cost or obligation, along with many other similar factual stories . . . full of ideas you can use to cut costs on secondary operations. Address: Dept. MMS 650.

**The Bellows Co.**  
Akron, Ohio

# SPEED REDUCERS

STANDARD IN PRINCIPAL  
FEATURES BUT ADAPTABLE  
IN CRITICAL DETAIL



**FARREL-BIRMINGHAM COMPANY, INC.**  
344 VULCAN STREET, BUFFALO 7, N. Y.  
Plants: Ansonia and Derby, Conn.,  
Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New  
York, Boston, Pittsburgh, Akron,  
Cleveland, Cincinnati, Detroit,  
Chicago, Los Angeles, Tulsa, Houston,  
New Orleans

Farrel speed reducers have been developed for continuous, trouble-free operation under difficult service conditions. Gears, shafts and bearings are factored to safeguard against interruption of vital processes; gear cases are proportioned to withstand repeated heavy peak loads; joints are sealed to prevent entrance of dust and dirt.

But, that is not all. Without sacrificing the advantages of general standards, the design of these units permits an engineering freedom in proportioning gears, shafts, bearings and even some housing dimensions to meet specific load, speed and service requirements. This flexibility allows an engineering exactness in critical detail, which has resulted in the solution of innumerable application problems.

Write for further details. Ask for a copy of Bulletin 449—no cost or obligation.

FB-593

## LEAD ACCURACY

WITHIN .0001" PER INCH  
IS NOT UNCOMMON...

IN

**Hanson-Whitney**

"FINISHED"

TAPS



The accompanying illustration shows perfect contact between the nut (internal) and the screw (external) threads...when lead, angle and diameters of both are correct.

Especially important in achieving this result is Lead Accuracy in the nut...obtainable only when "Finished" taps have been used in tapping the nut.

Hanson-Whitney "Finished Taps"...finished after hardening...with thread lead accuracy within .0001" per inch, together with correct form and diameters, will give you tapped holes of greatest accuracy...so necessary for today's production and assembly operations.

Hanson-Whitney equipment for producing "Finished Taps" adequately covers the entire tap field. Diameters from 1/16" to 7 1/2", and leads from 100 threads per inch to one thread in 7" can be produced. No better taps are made.

HANSON WHITNEY COMPANY, HARTFORD 2, CONN., Division of the Whitney Chain Company

Valuable engineering, illustrated  
Catalog on request. Please use  
your business stationery.

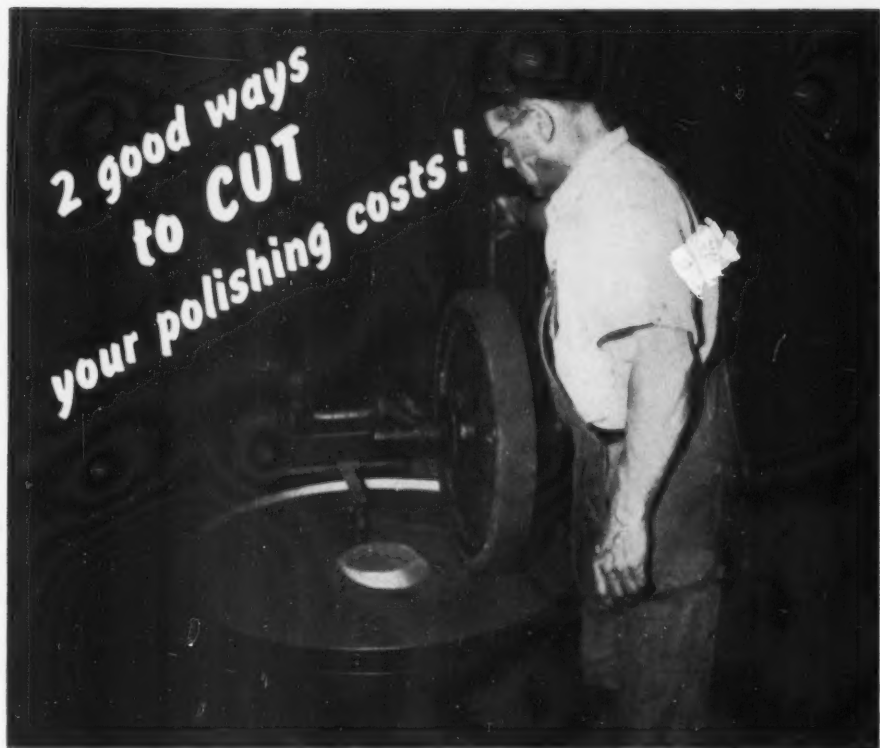
**Hanson  
Whitney**

PIONEERS OF FINISHED TAPS

6-10-50



2 good ways  
to CUT  
your polishing costs!



(1) Take advantage of these cost-cutting features of Norton ALUNDUM Polishing Abrasive: its extreme hardness and toughness; its uniformity of chemical composition and crystal structure; its uniform grain size; its variety of shapes and types of surface treatments; its high capillarity.

(2) Take advantage of the many helpful tips on polishing and setting-up metal polishing wheels and belts offered in this interesting 44-page Norton booklet. Send for your free copy —no obligation of course.

*This illustration of a glued wheel being rolled automatically is typical of the many helpful pictures shown in the booklet described below.*



**NORTON COMPANY • WORCESTER 6, MASS.**

DISTRIBUTORS IN ALL PRINCIPAL CITIES

**NORTON** ABRASIVES



## YOU'LL LIKE THESE *Family Features*

### OF THRIFTY CINCINNATI MILLERS

Thrift is a family characteristic of CINCINNATI knee-type milling machines. They have many features that save you money year after year. The five illustrated here are common to all CINCINNATI ML, MI, Dial Type, High Power and Dual Power Dial Types. They constitute five reasons why it pays to equip your shop with Cincinnati. Write for catalogs and then compare feature for feature with any other machine. For the long pull, you'll save with Cincinnati.

**THE CINCINNATI MILLING MACHINE CO.  
CINCINNATI 9, OHIO**



# Cincinnati

Cincinnati vertical screws never get stubborn and balky because they're automatically lubricated from an individual reservoir which you can fill with EP oil.

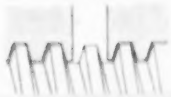
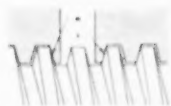
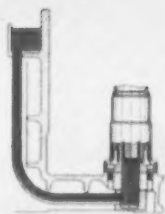
New men need no memory training course to operate a Cincinnati. As the lever is moved, so goes the feed motion; technically, it's independent directional control.

Soothing syrup to fretful cutting, Dynapoise over-arms dampen out chatter; pay off in higher feed rates for many setups.

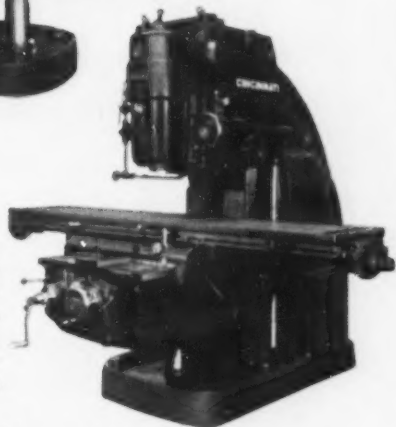
Hydraulic power does the work of shifting spindle speed gears . . . without effort, you can change spindle speeds as often as the job requires.

The villain of down-milling, backlash in the table feed screw is automatically eliminated.\* The unit is built in. Principle of operation is indicated in the drawings at the right.

\*Standard equipment, High Power and Dual Power Dial Types. Extra cost for other machines.



Left: 3 and 5 hp sizes, No. 2MI Plain and Universal, No. 2MI Plain, Universal and Vertical, No. 2MI Universal illustrated. Catalog M-1662-1.

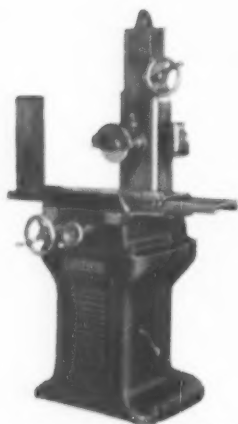


Right: The powerful group — High Power and Dual Power Dial Types — up to 50 hp for the largest size. No. 5 Vertical illustrated. Catalogs M-1644 and M-1647.

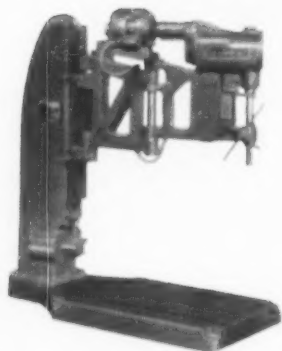


Left: Intermediate power, Nos. 2, 3 and 4 Dial Types; medium speed and high speed; Plain, Universal, Vertical, No. 2 Plain Dial Type illustrated. Catalog M-1623-1.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES  
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID



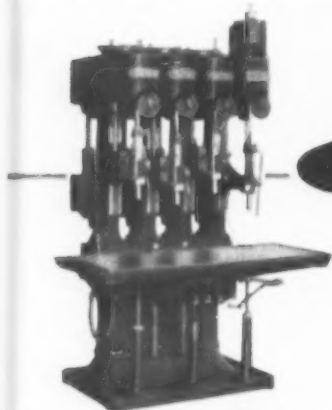
A very accurate 6" x 18" Hand Feed Surface Grinder especially adaptable for Tool Room Work and work on small, fussy pieces.



A Unique Radial Drilling Machine with Hinged Bracket that makes it possible to swing quickly from hole to hole over a wide area. A very convenient tapping arrangement is incorporated in this machine.

## A TIME TESTED LINE OF MACHINE TOOLS

*Engineered for Production*



Built in 1, 2, 3, 4 and 6 spindle models, also as a tool room drilling machine, these sensitive drilling machines are accurate for the most exacting work and have the usual Footburt sturdiness of construction to make them suitable for continuous production line work. The above 4 spindle machine has tapping attachment and power feed attachment.

● The choice of fine machine tools is an investment for future profits when products have to be made with increased accuracy and efficiency.

These machines are built with the usual Footburt workmanship and sturdiness that will keep them accurate over a long period.

**THE FOOTE-BURT COMPANY, Cleveland 8, Ohio**  
Detroit Office: General Motors Building

A TIME TESTED LINE OF MACHINE TOOLS

**FOOTBURT**  
*machine tools*

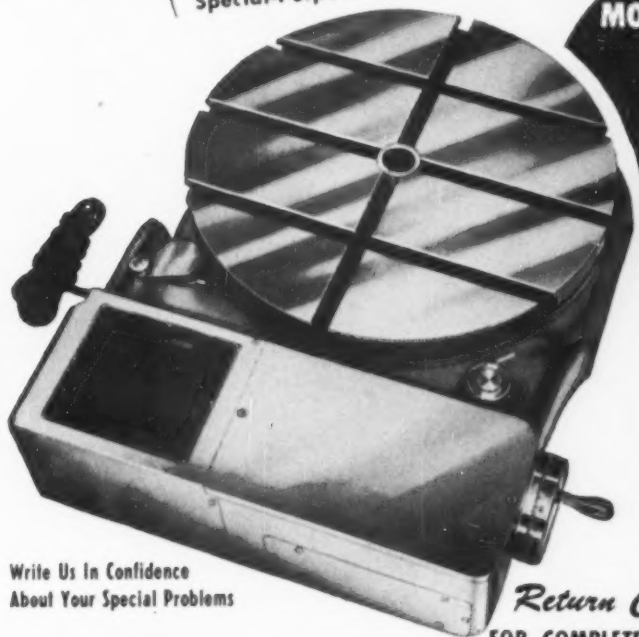
**ENGINEERED FOR PRODUCTION**

# MONEY-MAKER!

A SINGLE-UNIT SELF-CONTAINED  
MOTOR DRIVEN TIME AND LABOR SAVER—

Use It For

Rotary Milling and Indexing  
An Automatic Revolving Fixture  
Automatic Indexing  
Automatic Cycle Milling  
Cam Milling  
Special-Purpose Machines, etc.



**MOTOR-DRIVEN  
20"  
ROTARY  
TABLE**

- Eliminates all setup time — just plug into nearest electric outlet
- 18 Quick cutting feed changes — 1 1/4" to 54" or 3" to 108"

Write Us In Confidence  
About Your Special Problems

*Return Coupon*  
FOR COMPLETE DETAILS

**ATTACH  
TO YOUR  
LETTERHEAD**

**W.B. KNIGHT**  
MACHINERY COMPANY



3920 WEST PINE BLVD.  
ST. LOUIS 8, MISSOURI

W.B. KNIGHT MACHINERY CO., 3920 West Pine, St. Louis 8, Mo.

Send catalog page and price on the Knight 20" Rotary Table.

Name \_\_\_\_\_

Title \_\_\_\_\_

**MORE GOODS for MORE PEOPLE at LOWER COST**

## MORE CENTERLESS PRODUCTION with



No. 12 Centerless  
Catalog T-47

112

**LANDIS TOOL**  
*Precision  
Grinders*

If you have a precision grinding problem, LANDIS TOOL will make recommendations and production estimates on the basis of your blueprints.



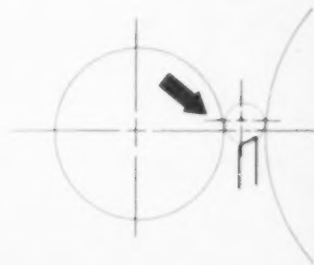
**these setup TIME SAVERS**

**exclusive with LANDIS TOOL**

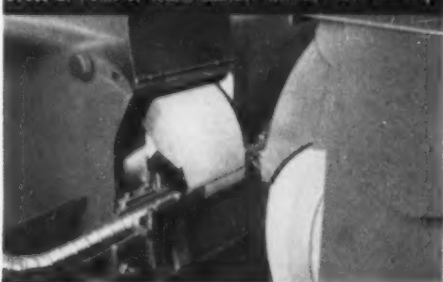
precision

centerless grinders

**dressing regulating wheel**



**Dress at Point of Work Contact Without "Cut and Try"**



**Instant Selection of Correct Dressing Speed**



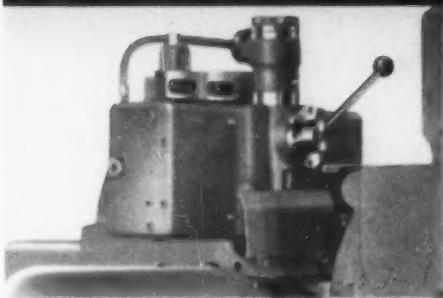
A turn of the selector switch changes the regulating wheel to the higher dressing speed without disturbing the work setup.

Diamond is permanently mounted on work rest in correct position for dressing along line of work contact. Arrows show location of diamond.

**3  
TIME SAVERS  
in  
Regulating Wheel  
Dressing**

**exclusive with LANDIS TOOL**

**Overhead Dresser For Infeed Form Grinding**



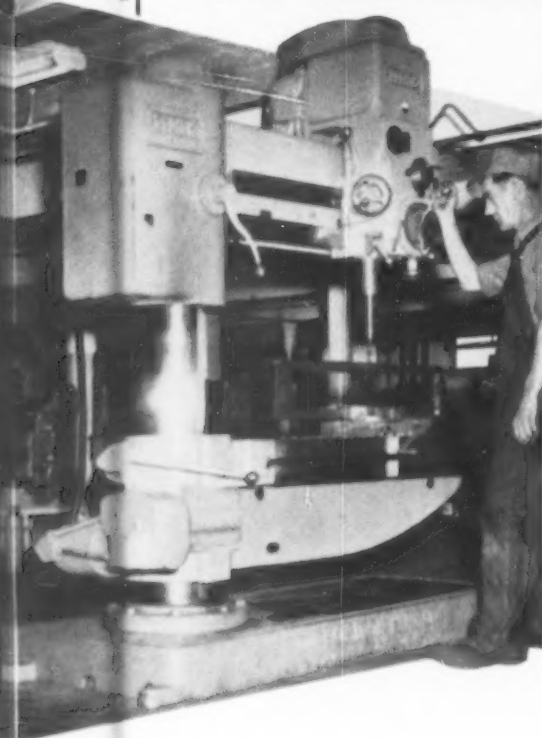
Hydraulically-operated dresser rigidly mounted on regulating wheel base. Profile bars readily changed.

LANDIS TOOL COMPANY

WAYNESBORO, PENNA., U. S. A.

*Fits right into your Production Scheme*

# FOSDICK Sensitive RADIAL



*This shows a Fosdick Sensitive Radial in operation at the Borden Mills Plant, Kingsport, Tenn. You'll find them saving time and costs in plants all over the country from Maine to California, and from Canada to Texas.*

Our new bulletin gives all the details of construction and fully describes its modern features. Write for the FOSDICK Sensitive Radial Bulletin S.R. M.M.S.

Because of its high utility factor this machine fills the gap between the large Radial and the Sensitive and Upright Drills. It fits right into the production scheme of both large and small shops.

It has the sturdy construction and flexibility of Radial design plus the high speed characteristics of the Sensitive Drill.

The heavy base construction—the one-piece column—and the adjustable swinging table assure unusual rigidity for sensitive drilling operations. The arm is at a fixed height within easy reach of operator on all jobs. Both table and arm swing in an arc of 360°.


The nine speeds and four feeds are controlled by means of direct reading levers on the head. Thus all operating feeds and speeds are easily attained from the operator's normal working position.

This comparatively new machine is finding its way into hundreds of plants where there are small pieces requiring a number of holes to be drilled. Perhaps it will fit into your production scheme at a cost that is surprisingly low.

# FOSDICK

**MACHINE TOOL CO.**  
CINCINNATI 23, OHIO

*Make your*  
**TOUGH  
 JOBS**  
*Easier*  
 with  
*Jarvis*  
**FLEXIBLE SHAFT MACHINES**



Dependable Jarvis Flexible Shaft Machines make your tough jobs easier — do them faster and more economically. Made to meet your individual requirements for grinding, cutting, buffing and many other operations, Jarvis Flexible Shaft Machines are available in bench, floor or overhead types — single or multiple speeds. Factory trained Jarvis representatives are ready to help you select the machines best suited to your own applications.

Long-lived Jarvis Rotary Files, depended upon the world over, are available in many shapes and flutings. For detailed information on Jarvis Flexible Shaft Machines and Rotary Files, write to The Charles L. Jarvis Company, Middletown, Conn.



TAPPING ATTACHMENTS • TECNI-TAPS and DIES • ROTARY FILES  
 FLEXIBLE SHAFTS and MACHINES • QUICK CHANGE CHUCKS and COLLETS

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

# MARVEL Saws Speed-Up Deliveries

**TUBE DISTRIBUTORS CO., INC.**

Office and Showroom: 240 Union Street, Brighton 22, R. I. Phone: (401) 659-2000

**Aretronic-Blum Mfg. Co.**  
5700 West Bloomingdale Avenue  
Chicago 39, Illinois

Gentlemen:

In a short time we expect to place an order with you for another No. 9A Marvel Automatic. This is in addition to the two we have already ordered.

There is a MARVEL Saw for every need—in every capacity range and price class. Your local MARVEL Sawing Engineer will gladly study your metal sawing problems and requirements and make recommendations as to methods and equipment.

Aracstrong-Blum Mfg. Co.  
5700 West Bloomingdale Avenue  
Chicago 39, Illinois

Gentlemen,

Is a short time we expect to place an order with you for another No. 9A Marvel Automatic Hack Saw. This is in addition to the two machines we now have. Our present Marvel Automatic Hack Saw is giving us very satisfactory service.

Our present Marvel Automatic Hack Saws are giving us very satisfactory service, enabling us to speed cutting of mechanical parts, enabling us to cut outers' required lengths at a minimum of cost, both for labor and blades.

Your service has been very satisfactory.

Your service and attention to our requirements have been very satisfactory.

Sincerely,

TUBE DISTRIBUTORS CO., INC.

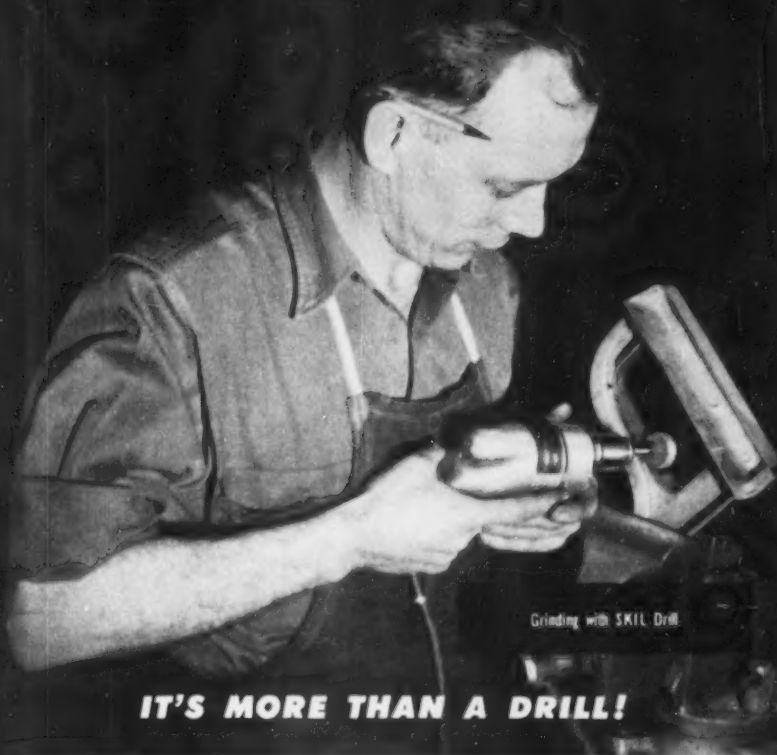
Superintendent

APL:CR

**MARVEL** *Metal Cutting*  
**SAWS**  
Better Machines - Better Blades

### "The Hack Saw People"

CHICAGO 39, U. S. A.



Grinding with SKIL Drill

**IT'S MORE THAN A DRILL!**

## **SKIL Drill speeds dozens of jobs . . . saves minutes and money on every one!**

Look at the big variety of jobs these SKIL Drills are built to do. Their *extra* power speeds all ordinary drilling, makes easy work of heavy boring, reaming and hole sawing and equips them to take on special applications like powering hoists and pipe threaders.

SKIL Drills provide this extra power without extra weight. Die-cast housings (pioneered by SKILSAW®) save important ounces in every model. Ask your own maintenance men about SKIL

Drills. Take their word for it, and you'll standardize on SKIL Drills from now on. Call your SKIL Tools Distributor *today!*

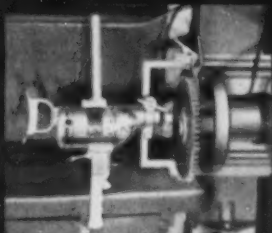
**SKIL**  
POWERED TOOLS

SKIL Products are made only by  
**SKILSAW, INC.**  
5033 Elston Ave., Chicago 30, Ill.  
Factory Branches in Principal Cities

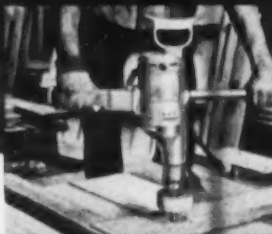
In Canada: SKILTOOLS, LTD., 66 Portland St., Toronto, Ont.



Wire brushing with SKIL Drill



Hoist powered with SKIL Drill



Reaming with SKIL Drill



Hole sawing up to 4 in. with SKIL Drill



Hack sawing with SKIL Drill



*Announcing*  
**NEW WALES** <sup>1/2</sup> <sub>IN</sub> THICK MILD STEEL  
FOR PUNCHING HOLES  
TYPE "G" UNITS



Showing a set-up of Wales Type "G" Hole Punching Units in a press brake. Note the holes punched in the strip of 1/2" thick mild steel.



Showing a powerful job. Piercing 1/2" thick mild steel is a powerful job. Wales engineers have developed an exclusive independent "Split Punch" eliminates stripping with the unique "Split Pressures" been associated spring doings that have material Wales Type "G" Hole punching in the new Wales Type "G" Hole punching has to do Units is to lift the punch to the "up" position after it do it better. do it simply other units may be rapidly mounted Like all other standard Wales Hole punches Wales Equipment, these T-slotted plates in press brakes on stamping presses and

Write TODAY  
for fully-illustrated Bulletin G.

Specialists  
In punching and Notching Equipment

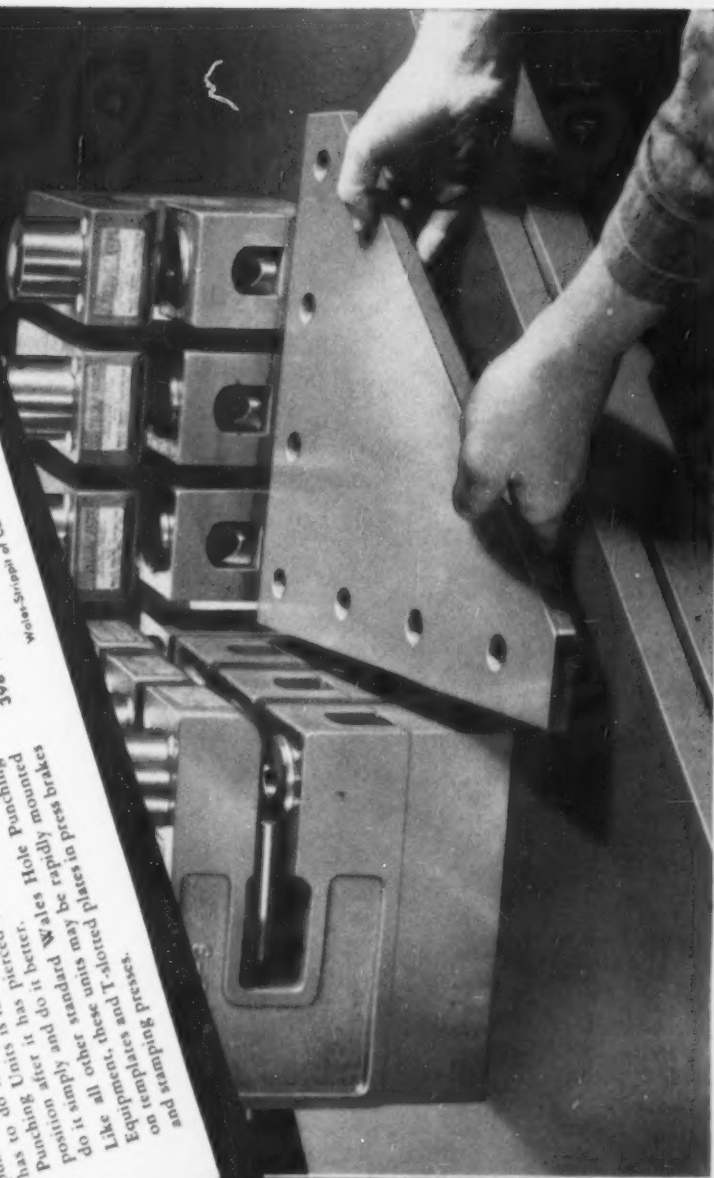
Wales-Strippit Corporation

George F. Wales, Chairman  
398 PAYNE AVENUE, NORTH YONKAWANDA, N.Y.

(between Fulton and Niagara Falls)

Water-Strippit of Canada Ltd., Hamilton, Ontario

Showing a stamping press set-up with a 1/2" thick punched gusset in the foreground and the Type "G" Units in background.



Delta-Milwaukee Toolmaker®  
Surface Grinder - \$375.00

# DELTA MILWAUKEE®

*Safety, Selection, Service, Low Cost  
in any grinder that you need*

Abasive  
Belt

Finishing  
Machine

\$121.20

Tool Grinder with

Safety Shields

(bench model)

\$95.00



Delta  
the most complete grinder line

**LOOKING** for a machine to cut your grinding costs? Delta has the answer — bench- and floor-model grinders of many types with the exact current and speed you need to meet your requirements — surface grinders, standard tool grinders, carbide grinders, chip-breaker grinders, tool-and-cutter grinders, abrasive belt machines, etc.

You'd expect to pay much more for the all-around high quality of low-cost Delta grinders. For example, the Delta-Milwaukee standard tool grinder has illuminated safety shields built in. Wheel guards meet

*Sold only through authorized dealers. Easy time-payments available. Look for the name "Your Delta dealer" under "Tools" in the classified section of your telephone directory.*



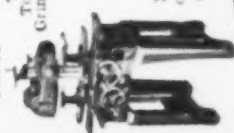
Tool Grinder (with Safety Shields) \$95.00



Belt Grinding, Polishing, and Deburring Machine \$130.75



Toolmaker's Chip Breaker \$412.50



Toolmaker's Grinder \$425.00

Motor and switch extra in some cases. Prices subject to change without notice.

**Plus**  
a complete selection of:

- 6 Circular Saws . . . 4 Jointers . . . 2 Saw-Jointer Combinations
- 2 Buffing Machines . . . 2 Planers . . . Mortiser . . . Lathe . . .



3 Band Saws . . . 4 Radial Arm Saws . . . 2 Shapers  
3 Cut-Off Machines . . . 2 Welders . . . 11 Drill Presses

**53 Machines — 246 Varieties**

strict safety regulations. Ball bearings are lubricated for life. Tool rests are completely machined, fully adjustable.

Delta, you know, is the industry's most complete line of metalworking and wood-working machines. It's the only line with complete accessories to make every tool do more jobs — and often save you a larger investment in other machines.

So, for a grinder — or any other machine — look to Delta's complete, quality line first. Send coupon for catalogs and bulletins on the entire Delta line.

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**Rockwell**  
Manufacturing Company

MILWAUKEE 1, WISCONSIN

DELTA • MULTIPLEX • CRESCENT • HOMECRAFT

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Send me free catalogs and bulletins on the complete Delta line.

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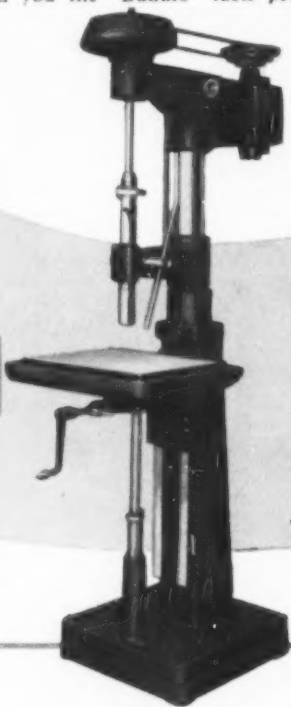
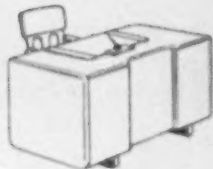
# PRODUCTIVITY

**THAT BRINGS UNIT COSTS DOWN!**

**W**HEN all is said and done, what the production manager needs in his drilling operations is the maximum number of holes per day. The greater the productivity, the lower are the unit costs in that department.

That's why, in plant after plant, the choice of drills has been "Buffalo". Ease of handling—simplicity of setup adjustments—rigid, rugged construction for lifetime accuracy—are the reasons.

If you want this profitable productivity, write us about your drilling operations, and we'll send you the "Buffalo" facts promptly.



**BUFFALO FORGE COMPANY**

388 BROADWAY

BUFFALO, NEW YORK

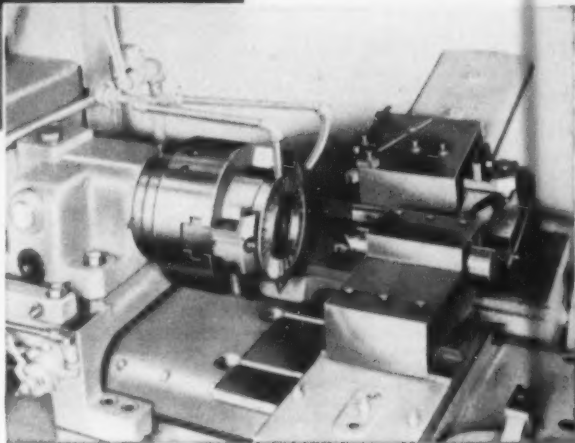
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



*Left: Several of a group of Lo-swing IMP's used in machining Automatic Transmission Parts.*



*Below: Close-up view of tooling.*

## AUTOMATIC TRANSMISSION PARTS MACHINED AUTOMATICALLY ON Lo-swing IMP

**Problem:** To bore and face welded Torque Converter Stator Assemblies. Parts must be held without distortion and machined within close limits.

**Solution:** IMP Automatic Lo-swing Lathes were selected for this work due to ease of operation, high spindle speeds, compactness and rigidity. The upper illustration shows several of a group of machines installed for this class of work. The lower illustration shows one of the lathes, with coolant guard removed, equipped for boring and facing one of the Torque Converter Stator Assemblies. The part is held in a three-jaw, air-

operated chuck fitted with wide mushroom type jaws to prevent distortion of the piece. The boring operation is made with two carbide tipped tools mounted in a boring bar and holder and fitted to the front slide. Tool relief is provided on the return stroke. The facing and trimming tools are mounted on a template controlled rear tool block which permits the facing operation to be made at the correct angle. The operation is entirely automatic, the operator simply loads and unloads the parts.

Engineered jobs are our specialty. Our staff is at your disposal to help solve your problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing

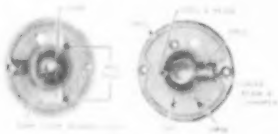


# Completely Automatic

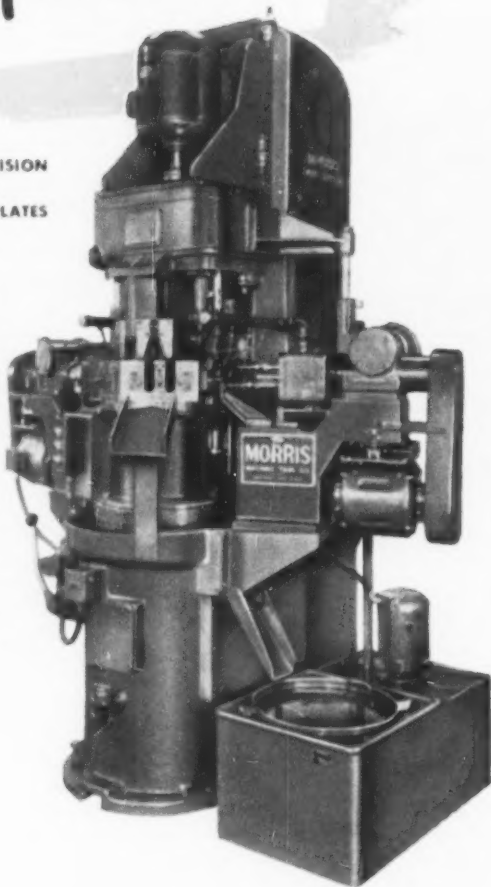
MORRIS *Mor-Speed* MACHINE, PRECISION  
MILLS, DRILLS, REAMS AND TAPS BOTH  
SIDES OF TWO DIFFERENT GENERATOR END PLATES

Eliminating re-positioning the part or "double loading," either of which involves extra handling, this MORRIS Mor-Speed Production Machine performs multiple machine operations on both sides of two sizes of generator end plates. This Multiple Spindle machine, an installation of a large automobile manufacturer, has a completely automatic cycle. The work piece is automatically clamped in position, all operations (including burring) accurately performed, and then automatically ejected.

Think of the space required for separate machines to perform these milling, drilling, reaming and tapping operations, the handling at each machine and the handling between machines! If you have a production problem involving two, three or more machining operations on the same part, consult Morris Engineers. They may be able to suggest a money-time-and space-saving Mor-Speed unit. In any event, there's no cost or obligation.



GENERATOR END PLATE  
VIEW FROM TOP



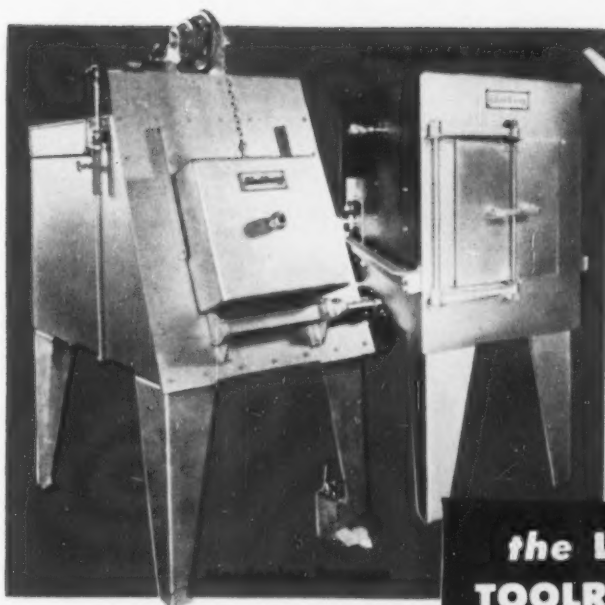
THE **MORRIS**  
MACHINE TOOL COMPANY

933 HARRIET STREET CINCINNATI 3, OHIO

"A better product  
at less cost —  
with MORRIS  
ENGINEERED PRODUCTION"







## BASIC FOR EVERY TOOLROOM

### the LINDBERG TOOLROOM TEAM

When production depends on tools and dies, tools and dies depend on the LINDBERG TOOLROOM TEAM—a basic requirement in every toolroom—a must where you want the ultimate in tools and dies which will keep your production rate up and your machinery running with a minimum of tool and die failure. THE LINDBERG TOOLROOM TEAM gives you the precision heat treating which your precision tools and dies need for lasting performance.

**LINDBERG HARDENING FURNACE** — eliminates finishing due to scale and decarb with simple accurate atmosphere control.

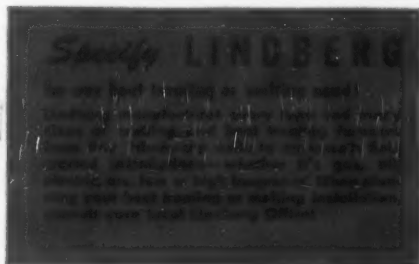
**LINDBERG TEMPERING FURNACE** — allows you to obtain the exact "Rockwell Hardness" required for each specific tool or die.

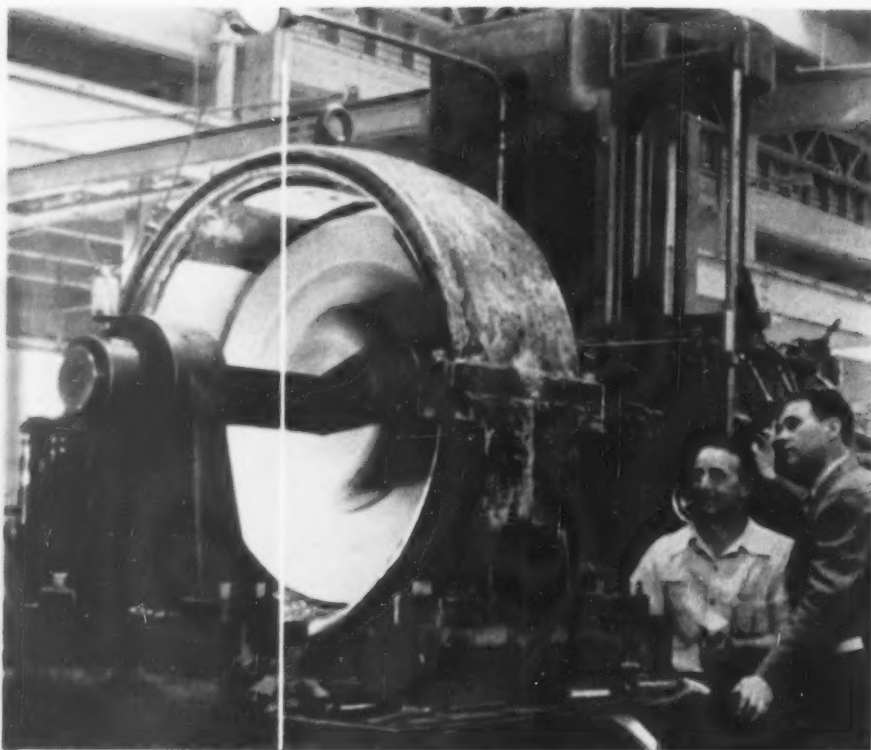
*For tools and dies requiring high speed tool steel—investigate the Lindberg "L" Type combination preheat—high heat Furnace.*

## LINDBERG FURNACES



LINDBERG ENGINEERING COMPANY  
2469 W. Hubbard St., Chicago 12, Ill.





## GOING DOWN

boring time on elevator motor frame  
(time saved: 65%)

This unusual job was done at Shepard Elevator Co., Cincinnati, Ohio, with an ingenious tooling arrangement: 12 step tools on a cast aluminum boring head were arranged so that machining was continuous. Speed: 12 rpm. Feed: .125" per revolution on rough cut; .030 per revolution on finishing cut. Mr. E. R. Brodeen, Works Manager, states that the new GILBERT has displaced the old Boring Machine and practically eliminates a vertical Boring Mill from production . . . Save time and money by replacing old equipment with modern Cincinnati Gilbert Boring Mills, and make a *big return on your investment* . . . The Cincinnati Gilbert Machine Tool Co., 3360 Beekman St., Cincinnati 23, O.

*Previous time: 45 hours. Now 16 hours. Saved: 29 hours. The job: boring six internal pads (12 1/4" x 13") on 1020 cast steel motor frame. Bore diameter: 42". The machine: Cincinnati Gilbert 3 1/2" Spindle Horizontal Rectangular Table Type Boring Mill. Boring bar: 5 3/4" dia.*

## THE CINCINNATI GILBERT MACHINE TOOL COMPANY

RADIALS • HORIZONTAL BORING MILLS • ACCESSORIES

**THOSE WHO BUY GILBERT BUY GILBERT AGAIN**

# SLASH SET-UP TIME

## with J&S KOALA

### CIRCULAR CUTTING TOOLS

**W**ITH these J & S Time Savers—available in carbide or high speed steel, at reasonable prices—each new or re-sharpened cutter can be inserted without resetting machine or stops in any way! This is possible because each cutter accurately repeats the original set-up position when it is inserted into the shank. Removing and inserting is quick and simple. Different types of cutters can be used in the same shank. J & S KOALA TOOLS are easy to re-grind with any desired rake. Cutters may be re-ground without a jig. It is not necessary to re-grind any predetermined amount off the rake surface. With KOALA TOOLS, the same tool can be used for turning and facing—the same shank may be used for forming, necking and grooving—and the same internal tool can be used for internal facing or boring.

#### PRINCIPAL USES

**Boring Bars:** Boring, Facing, Threading, Forming.

**External Turning Tools:** Turning, Facing, Forming, Threading

*Write for Further Information*

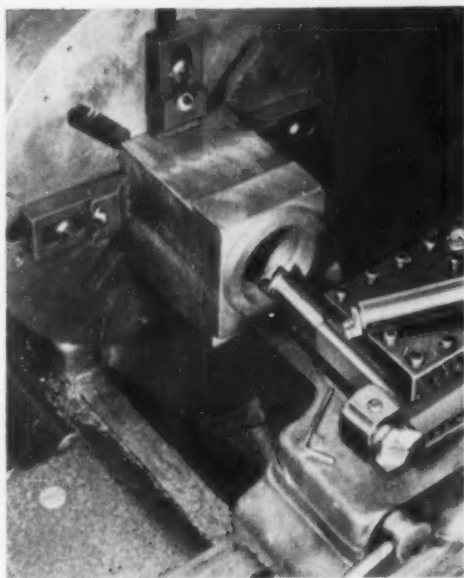


Photo shows typical deep boring, boring and internal facing operation for bearing seat, and external facing and turning. The 12" J & S KOALA Boring Bar is removed from turret to show carbide head after numerous re-grinds.

**SEND FOR BOOKLET,**  
"Machine Shop TIME  
SAVERS by J & S".  
Illustrates and explains:  
J & S "Fluidmotion"  
Dressers, KOALA Circular  
Cutting Tools,  
"Down-Hold" Vise  
Jaws and "Attachable"  
Parallels, "All-Purpose"  
Jaw Clamps, and  
J & S Form Grinding Service.

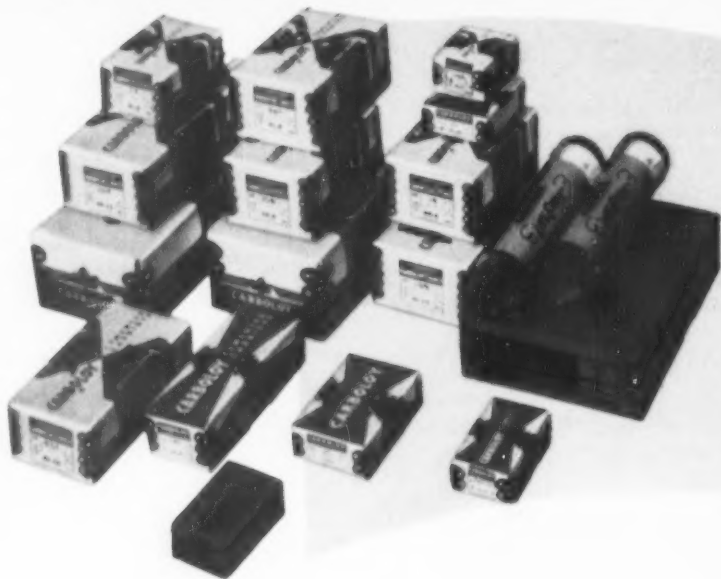


# J&S TOOL CO. INC.

475 MAIN STREET  
EAST ORANGE,  
NEW JERSEY

# There is no substitute for Carboloy Quality

*Consistently sell more, order more, package after package, job after job  
no matter which Carboloy Tool or Blank you specify.*



## SPECIFY

# ...when you want these 4 results plant-wide

## 1 Lowest plant-wide average tool cost per piece machined

"Tool life has been increased from 6 to 50 times, with piece production almost doubled in many cases."

*Eastern washing machine manufacturer\**

## 2 Highest plant-wide average production per machine

"With fewer machine tools in operation, production was more than doubled, but cost per piece was not increased... despite wage and material cost increases."

*Midwest manufacturer\**

## 3 Lowest plant-wide average machining cost per piece machined

"On 1500 jobs tooled with Carboloy, machining costs dropped an average of 25% and machine capacity increased an average of 43%."

*Machine tool manufacturer\**

## 4 Close plant-wide production control standards to which you can absolutely adhere

"Our tool and methods engineers have used predetermined time standards, but have found greatest benefits are possible only with the long life and repeated uniform performance of carbide tools."

*Large manufacturer of pumps\**

### CARBOLOY COMPANY, INC.

11147 E. 8 Mile Blvd., Detroit 32, Michigan

\* Name on request



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Today!**

The most spectacular results are obtained when Carboloy Cemented Carbides are used under Carboloy Company's unique "Triple C" Plan of Coordinated Carbide Control. It has worked wonders for others; it can do the same for you. Write today for your copy of the CCC Plan Book that explains in detail how this program operates. No cost, no obligation.

# CARBOLOY®

THE UNIFORM CARBIDE



*Ready*  
**FOR**  
*You!*

WRITE FOR  
NOPAK  
BULLETIN HC-1

## *New Bulletin* PRESENTS NOPAK "SERIES 1500" HIGH PRESSURE HYDRAULIC CYLINDERS

Designed for heavy duty service at high pressures, the New 1500 Series embodies features which contribute to long-range dependability and trouble-free operation. Included are: Positively Locked Piston Assembly, Tubing Flanges secured by Lock-Rings, Compensating Rod Wipers, "O"-Ring Static Seals between heads and tubing. Available in 5 standard mountings, with or without Adjustable Cushioning.

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2758 SOUTH 31st STREET  
MILWAUKEE 46, WISCONSIN

**NOPAK**  
**VALVES AND CYLINDERS**  
DESIGNED for AIR and HYDRAULIC SERVICE

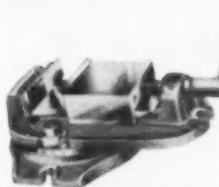
Representatives in Principal Cities



# **Bridgeport**

**modernizes  
MILLING, DRILLING and BORING  
on a wide range of heavier work**

Many more classes of work are now being handled on the "Bridgeport," because the new 1 H.P. head has increased the capacity of this machine for much heavier work. New attachments, too, developed by "Bridgeport" have extended the utility of this machine so that churning, as well as right angle milling and drilling can now be handled with speed, convenience and accuracy. Convenience and versatility are also extended by the new "Bridgeport" Milling Machine Vise and Boring Head. More than 12,000 "Bridgeports" are already improving methods and practices in tool rooms and on production lines. What they are doing for others they can do for you. It will be to your advantage to investigate...NOW.



#### **Milling Machine Vise**

Attractively styled, this high quality vise conforms to the modern look of "Bridgeport" machines. Great gripping power and rigid holding of work assured by large diameter screw. Two sizes available: 5" x 3 1/2" and 6" x 5" jaw openings.



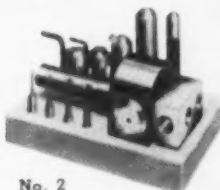
#### **Heavy Duty Right Angle Attachment**

Designed to mill and drill at right angles. Built in two sizes to fit both the Master and 1 H.P. Milling Heads.



#### **Light Duty Right Angle Attachment**

Specially designed to mill and drill narrow, deep molds and cavities.



#### **No. 2 Boring Head**

Designed to fit the new 1 H.P. Bridgeport Milling, Drilling and Boring Attachment. Boring tool with holder are included, making it possible to bore holes up to 6" dia.



#### **Cherrying Attachment**

Makes possible production of convex and concave shapes. Ideal for producing drop forge dies, molds, cavities, metal core boxes, etc.

# **Bridgeport**

## **MACHINES, INC.**

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

Bolt Sockets

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Bolt

Ball Sockets

Wrenches

Electric Sockets

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Impact Wrenches

Model

Nut Sockets

Flaming Sockets

Pushers

Wrenches

Steel Wrenches

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Socket

Socket

Steel Sockets

Steel Sockets

Socket

Steel Sockets

Steel Sockets

**DO EVERY NUT RUNNING JOB  
EASIER... FASTER!**

**17  
SIZES**



## *Thor* AIR IMPACT WRENCHES

Here are real cost savers on every nut running job—assembly or service...the full-range line of Thor Pneumatic Impact Wrenches. 17 popular styles and models in capacities from  $\frac{1}{4}$ " to  $1\frac{1}{4}$ "...every one unmatched for power and long service because of Thor's unique striking mechanism. Write or call for a free trial that will prove how Thor Wrenches cut labor costs. Independent Pneumatic Tool Co., Aurora, Ill.



FREE—64-page catalog describes full line of air tools by Thor—tool-makers since 1893.

*Thor* **TOOLS**

**ELECTRIC • PNEUMATIC**

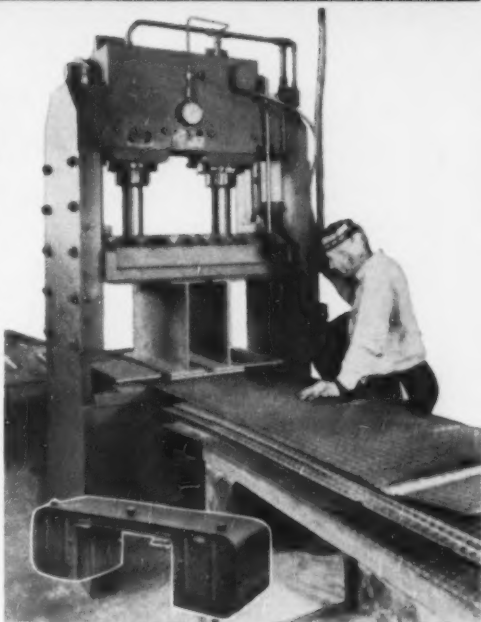
" I wouldn't sell it  
for twice what it Cost "

● PERKINS WELDING SAYS  
KRW 100-TON PRESS PAID  
FOR ITSELF IN SIXTY DAYS  
THRU MATERIAL AND LABOR  
SAVINGS !

BIG TRAILER TRUCKS eat up a lot of gas on an average run. For that reason, most are equipped with big "saddle tanks" which hold 125 gallons or more...thus obviating frequent stops to fuel up. Perkins Welding makes these super tanks out of 1/8 inch steel. Until recently, they welded angle stiffeners onto the tanks for extra strength. A KRW Engineer showed them how they could save considerably by forming stiffening ribs on a KRW 100-Ton Press. The result...savings so great that "it paid for itself in 60 days."

"You don't need a sledge to drive a tack." For the same reason...on a big percentage of forming, blanking and stamping work...you don't need large, heavy-tonnage presses with their high initial and operating costs.

Production records, in a variety of industries, show that KRW Presses greatly reduce costs. First investment is very low, operating costs are still lower. In one instance the purchase price of a KRW Stamping Press was less than the foundation cost for heavier equipment.



LET US KNOW YOUR NEEDS

...we are fully equipped to engineer our equipment to handle your work. In the majority of cases, we can make delivery in a fraction of the time required for other type presses. Let us hear from you.

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please quote me price and information on  
KRW 100-Ton Hydraulic Press.

16

Tonnage Req. ....

Name .....

Address .....

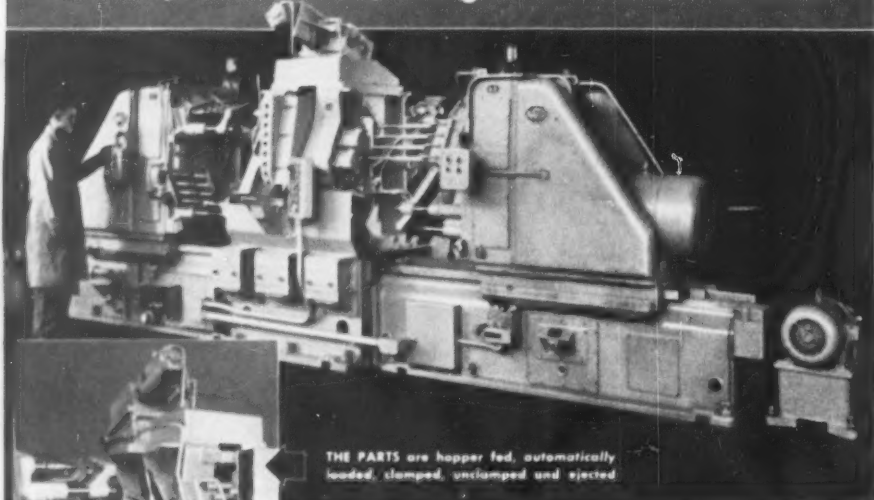
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**K·R·WILSON**

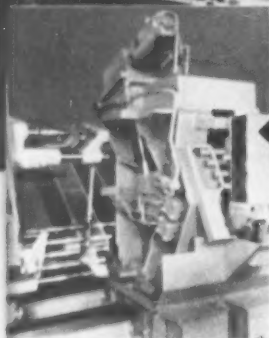
215 MAIN ST. BUFFALO 3, N. Y.

# 575 PISTON PINS PER HOUR

Drilled, Chamfered, Rough and Finish Reamed



THE PARTS are hopper fed, automatically loaded, stamped, unclamped and ejected.



Chip conveyor attached to rear of fixture pedestal runs in under fixture and carries chips out of machine.

Write today for NATCO "Success Story" No. 3 and investigate...

**NATCO DRILLING, BORING, TAPPING AND FACING MACHINES**

Dept. MM



*Call a Natco Field Engineer*



## PART: Piston Pins

**PRODUCTION:** Approximately 575 parts per hour

## OPERATIONS:

- Position No. 1  
Load four parts automatically
- Position No. 2  
Right and Left Hand Heads  
Drill for .632" dia. 1/3 through
- Position No. 3  
Right and Left Hand Heads  
Drill for .632" dia. 2/3 through and chamfer 1/8
- Position No. 4  
Right Hand Head  
Drill for .632" dia. across center (L&R Hand Head idle)

- Position No. 5  
Right Hand Head  
Bore run through using accelerated spindles
- Left Hand Head  
Idle
- Position No. 6  
Right Hand Head  
Idle
- Left Hand Head  
Bore run through to .632/.632" dia. using accelerated spindles
- Position No. 7  
Unload four parts automatically

This is just one of many examples of the way NATCO machines contribute to higher production and lowered costs. Send us your drilling, boring, tapping and facing problems... our engineers have the solution.

**NATIONAL AUTOMATIC TOOL COMPANY, INC.,** Richmond, Ind., U. S. A.  
Branch Offices: 1809 Engineering Bldg., Chicago • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffalo • 2902 Commerce Bldg., New York City

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Since the first announcement, hundreds of tool steel users have received their CRUCIBLE TOOL STEEL SELECTORS. The comments received indicate that this handy method of picking the right tool steel right from the start is going over big

"Handiest selector I've ever seen"

"No more gambling on tool steel selection"

"You're right, the application should dictate the choice of the tool steel" . . . and many, many more favorable comments.

You'll want your CRUCIBLE TOOL STEEL SELECTOR. It uses the only logical method of tool steel selection—begin with the application to pick the right steel! And the answer you get with one turn of the Selector dial will prove satisfactory in every case, for the CRUCIBLE TOOL STEEL SELECTOR covers 22 tool steels which fit 98% of all Tool Steel applications. ALL the tool steels on the Selector are in Warehouse Stock . . . that means when you get the answer, you can get the steel . . . fast!

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Selector diameter 9", in 3 colors

Crucible Steel Company of America  
Dept. MS, Chrysler Building  
New York 17, N. Y.

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Sure! I want my CRUCIBLE TOOL STEEL  
SELECTOR!

Name  Title

Company

Street

City  State

## CRUCIBLE

first name in special purpose steels

## TOOL STEELS

fifty years of *Fine* steelmaking

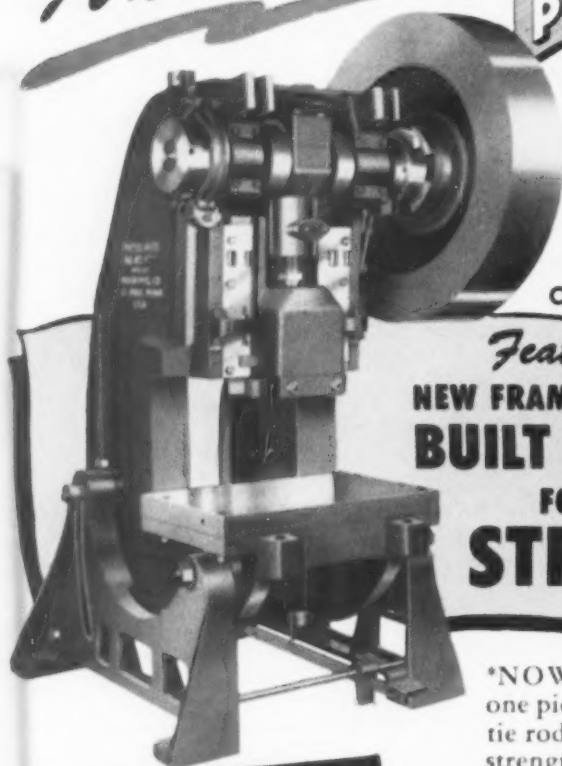
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*Announcing*

**THE NEW**  
**PRESS-RITE**

**85 TON**  
**POWER**  
**PRESS**

OPEN BACK • INCLINABLE



*Featuring...*

**NEW FRAME DESIGN\* WITH**  
**BUILT IN TIE RODS**  
**FOR GREATER**  
**STRENGTH**

**PRESS-RITE POWER PRESSES**  
**ARE BUILT IN SIZES**  
**FROM 5 TO 85 TON!**

\*NOW... a completely new one piece gap frame, with two tie rods built in give you extra strength, rigidity and insured extra tonnage at NO EXTRA COST. EXCLUSIVE on Press Rite Power Presses.

**DON'T DELAY...** This Press was recently shown at the ASTE EXPOSITION!

**...WRITE FOR COMPLETE DETAILS NOW!**

*Sales Service Machine Tool Co.*



PRESS  
RITE  
PRESSES



SHAPE  
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SHAPERS



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HACK SAWS

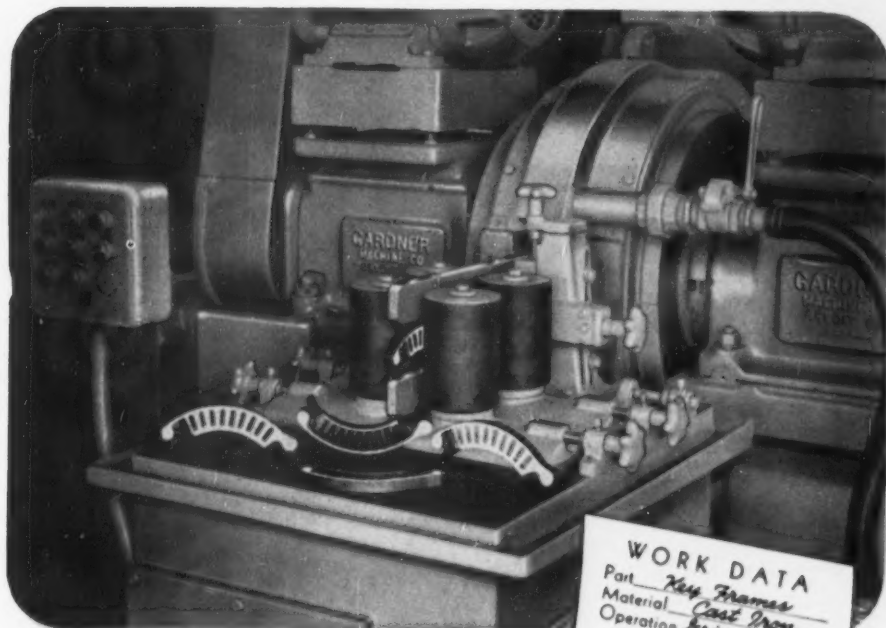
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ST. PAUL 4, MINNESOTA



# Double GARDNER GRINDING

brings your costs

**DOW**N



GARDNER Semi-Automatic Double Grinders, like the No. 125-26" machine with "feed-thru" fixture, illustrated, provide the answer for reducing your flat-surfacing costs because both sides of the piece are precision ground at one pass. A wide variety of parts can be handled by this method.

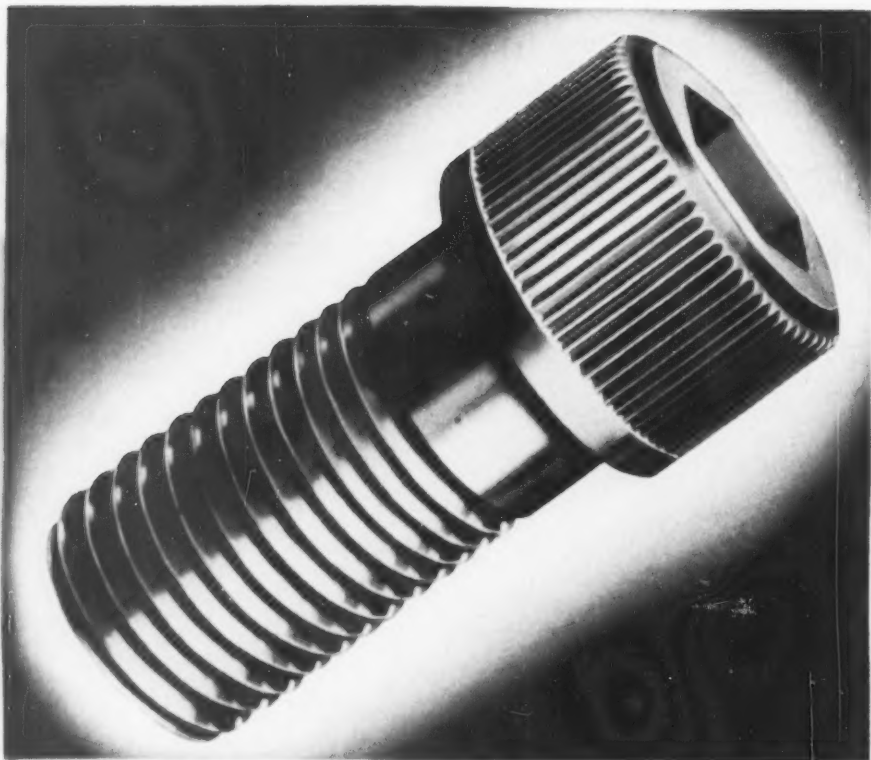
High production and lower unit costs are two items all-important in manufacturing for today's market. Look to Gardner Double Grinding for your lower unit costs!

WORK DATA	
Part	<u>Key Frames</u>
Material	<u>Cast Iron</u>
Operation	<u>Grind Two Sides of Unequal Area</u>
Tolerances	<u>.001 for Parallelism: .002 for Uniformity</u>
Stock Removal	<u>.075 Over All</u>
Production	<u>10 to 12 Pieces Per Minute, Per Cut</u>
Feed	<u>"Feed-Thru" Fixture with Rubber Rolls</u>
Machine	<u>No. 125-26"</u>
	<u>Gardner Double Grinders</u>

Ask for our **DOUBLE-GRINDING** Bulletin!

## GARDNER MACHINE COMPANY

428 EAST GARDNER STREET . . . BELOIT, WISCONSIN, U.S.A.



## The **UNBRAKO** Socket Head Cap Screw

... is specified by designers and production men everywhere because of its *time-saving* knurled head and its uniformly high quality.

Knurled Head Socket  
Cap Screws

Flat Head Socket  
Cap Screws

Self-Locking Socket  
Set Screws

SOCKET



SCREWS

Knurled Head  
Shoulder Screws

Precision-Ground  
Dowel Pins

Fully-Formed  
Pressure Plugs

**-SPS** **STANDARD PRESSED STEEL CO.**  
JENKINTOWN 22, PENNSYLVANIA

**"BEST BUY** the boss ever made  
... \$485 does the work of \$2000!"

**LEACH  
6 X 12  
SURFACE  
GRINDER  
ONLY**

**\$485<sup>00</sup>** COMPLETE WITH MOTOR

F. O. B. PROVIDENCE, R. I., U. S. A.

**HIGH OUTPUT at LOW COST**

Don't let the low price fool you! The Leach 6 x 12 Surface Grinder is an entirely new engineering triumph that does the BIG jobs. Easily and accurately handles 90% of the work of far more expensive machines. A proven giant money-saver by hundreds of enthusiastic owners. Completely self-contained . . . 2-speed ball bearing spindle, driven by a  $\frac{3}{4}$  HP motor. Nowhere else can you get such high output at such low cost! Write for detailed description.



**H. LEACH MACHINERY CO.**

387 CHARLES STREET

PROVIDENCE 4, R. I., U. S. A.

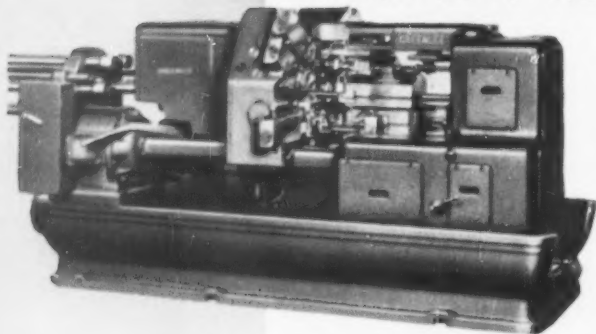
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DEALERS IN PRINCIPAL CITIES

**RUGGED, COMPACT, EFFICIENT**

# **GREENLEE**

**SIX-SPINDLE AUTOMATICS**



## **CUT COSTS** *on all kinds of JOB SHOP WORK*

GREENLEE Automatic Screw Machines are rugged, compact, surprisingly simple in operation and maintenance, and unusually versatile. Check these time-saving and cost-cutting features.

### **INTERCHANGEABLE CROSS SLIDE CAMMING**

All six cross slide cams can be replaced in less than 6 minutes, and only 15 cams handle 90% of the average job-shop requirements.

### **STANDARDIZED TOOLING SPEEDS SET-UPS**

With identically machined tool cavities and interchangeable tool holders, Greenlee Automatics make quick job changes a cinch. You save in equipment costs, too!

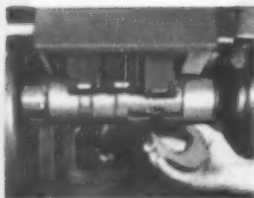
### **A SIMPLE ADJUSTMENT SETS THE STROKE**

A graduated worm-wheel permits an accurate setting of the tool slide stroke in a simple, easy operation without guess-work, fuss, or bother.

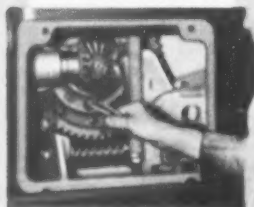
### **A ROOMY TOOLING AREA HELPS OPERATORS**

There's plenty of elbow room in the tooling area, making it easy for operators to accurately position tools and attachments for best results.

WRITE TODAY... **GREENLEE BROS. & CO.**  
GET COMPLETE, DETAILED INFORMATION.  
888 N. MASON AVE., ROCKFORD, ILL.



CHANGING A CROSS-SLIDE CAM



SETTING TOOL-SLIDE STROKE



**DRILLING, BORING, TAPPING MACHINES • SCREW**

**MACHINES • TRANSFER PROCESSING MACHINES**

**HARDINGE**  
ELMIRA, N.Y.

*Revolutionary  
Development*  
*New* **LATHE CONSTRUCTION**

**HARDINGE Model HL**  
**with Full Bearing Carriage**

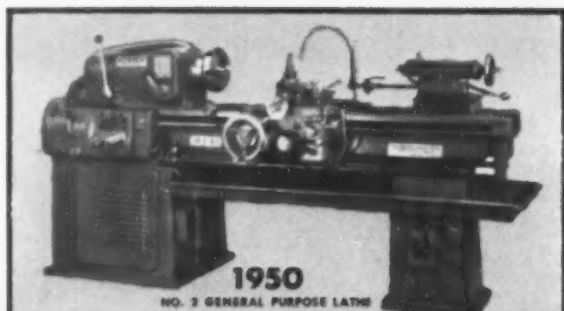


**The HARDINGE General Purpose Lathe**  
with Full Bearing Carriage features:

- Solid Steel Hardened and Ground Bed Ways
- Full Bearing on Top of Bed
- Full Bearing on Side Dovetails
- Sustained Accuracy and Absolute Rigidity



**HARDINGE BROTHERS, INC., ELMIRA, NEW YORK**



NO. 2 GENERAL PURPOSE LATHE

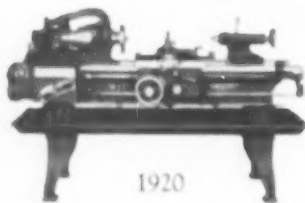
**... If you are not using Modern Hendey Machines you are not earning the profits that you should!**



The new Hendey No. 2 General Purpose Lathe is the ultra-modern successor of the famous Hendey Cone Head Lathe and was designed especially to perform tool room work with the greatest ease—at the greatest profit. A single lever instantly shifts the belt to any of the eight spindle speeds. There is an independent motor in the base and a unique design feature that completely eliminates belt pull on the spindle. The operator

has a choice of 48 thread and speed changes. Both the carriage and tailstock ways are induction hardened and precision ground. Other *plus* features include cam lock or long taper key drive spindle noses—preloaded, super-precision spindle bearings—automatic lubrication—a swing of 16" and a wide choice of bed lengths.

This is truly a modern lathe to meet modern tool room requirements. Write for catalog.



Thousands of these old Hendey Cone Head Lathes are still in use throughout the world. Compare their performance against the new No. 2 General Purpose. The old Cone Head has overhead, manual belt shifting. Belt pull is direct on spindle from countershaft drive or motor on bracket. Top speed is 465 R.P.M. Bed is hand scraped, soft cast iron. A wonderful machine in its day, but not adequate for today's needs. How many of these in your shop? ... losing money!

✓ Continuous, advanced engineering by Hendey is worth watching—and must be watched if you are to earn full profits from your lathes and shapers. For more price particulars and prices, contact your nearest Hendey office.

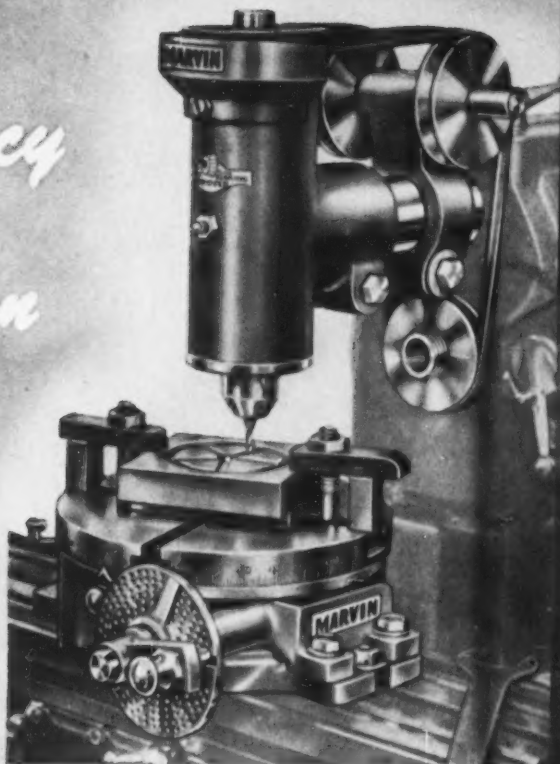
**MODERN**  
*Hende***Y**

THE HENDEY MACHINE COMPANY  
MAIN OFFICE & PLANT: TORRINGTON, CONN.  
BRANCH OFFICES: New York, Chicago, Boston, Detroit,  
Rochester, Los Angeles, San Francisco  
REPRESENTATIVES: Philadelphia, Cleveland, Pittsburgh



**GREATER**  
*Efficiency*  
**GREATER**  
*Precision*  
*at Less Cost*

**with MARVIN  
VERTICAL MILL  
ATTACHMENTS**



The Marvin Vertical Mill Attachment will give your bench mills greater versatility (up to 400%) and a wider range of operation at less cost than other attachments.

The Marvin Vertical Mill Unit can be set at angles, pulled out far past the travel of the table for overhanging work.

This Marvin Head has a heavy spindle that turns on Timken tapered roller bearings which assures very smooth operation at high speeds. Spindle nose takes end mill with  $\frac{3}{8}$ " straight shank, up to  $\frac{1}{2}$ " diameter cutter. Unit is machined to slip over  $1\frac{1}{2}$ " overarm. Easily adapted to other size overarms by bushing or turning down a special overarm.

PRICE **\$65<sup>00</sup>**

Also illustrated is the New Marvin Rotary Index Table priced at \$93.00.

Write today for complete technical information. It will save you money.

Copyrighted 1950 by H. B. Hazerodt

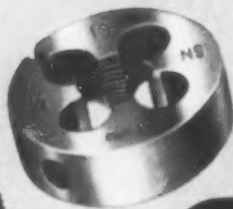
**MARVIN**

**MACHINE PRODUCTS, INC.**

SALES OFFICE • 414 FORD BLDG.  
DETROIT 26, MICHIGAN

# BAY STATE

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**BAY STATE TAP & DIE CO.**  
MANSFIELD, MASSACHUSETTS

\* Fluid Power Improves Production

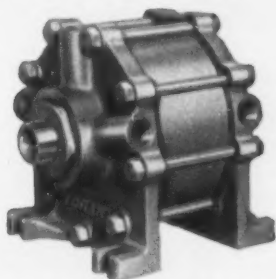
# "LOGAN" AIR CYLINDERS

STANDARD AND HEAVY-DUTY MILL-TYPE

LOGAN FEATURES  
THAT ASSURE PEAK  
PERFORMANCE AND  
LONG LIFE . . .

- Larger ports for quicker response.
- More sturdy construction.
- Standard models available with or without cushioning.

Fast-Acting, Positive Controlled  
Power . . . At Low Cost



LOGAN STANDARD  
AIR CYLINDERS

Replace most manual operations . . .  
eliminate human error.

## 7 STANDARD MOUNTING TYPES

Standard sizes from 1½" to 12" bore;  
maximum stroke, 18 feet.

Special to meet your requirements.

### \* ENGINEERING COUNSEL

Consult our engineers.  
No obligation.

# Logan

SAVES  
• TIME  
• EFFORT  
• MOTION

*Air and Hydraulic Equipment*

LOGANSPORT MACHINE CO., INC.

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Logansport, Ind.

CHUCKS • CYLINDERS • VALVES • PRESSES • SURF-FLOW COOLANT PUMPS

## LOGAN HEAVY-DUTY MILL- TYPE AIR CYLINDERS

For steel mill or aluminum extrusion mill,  
foundry and heavy-duty service.

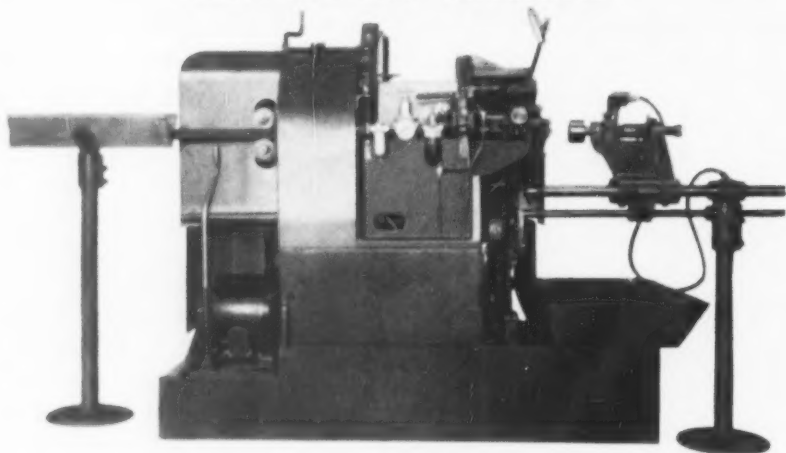
### FREE CATALOG

Get your free copy of catalog containing complete information on Logan air cylinders, control valves and air accessories



FLUID POWER SPECIALISTS SINCE 1916

## The NEW MODERN AUTOMATIC CUTTING-OFF MACHINE



### Cuts Off Tubing, Pipe and Shafting...FAST

Cuts off longer pieces than a regular automatic machine. In fact, cuts off *any length you want*—and cuts it faster. If your production requires quantity cutting-off of tubing, pipe or shafting, check the figures below against your present time.

#### **1/2" Tubing**

This machine cuts off and chamfers both outside edges of 1/2" .030 wall tubing, 5' long at the rate of one every 2.5 seconds.

#### **1 1/4" Cold Rolled**

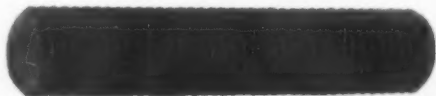
This machine cuts off and chamfers both ends of 1 1/4" cold rolled, 20' long, at the rate of one every 20 seconds.

#### **1" Tubing**

This machine cuts off and chamfers both outside edges of 1" of 3' long, at the rate of one every 3 seconds.

These popular, time saving machines are now available in two sizes, handling work up to 3" O.D. Their many cost cutting features are described and illustrated in our latest catalog that will be mailed promptly on request.

#### **4" Threaded Studs**



Cut and chamfered at one time—in 8 seconds—from 10 ft. length of stock already threaded. (1/4" U. S. Standard.) Clean cut. Clean chamfer. Nuts start easily, with no extra finishing required.

WRITE FOR ILLUSTRATED CATALOG.

**MODERN MACHINE TOOL CO.**  
Jackson, Michigan

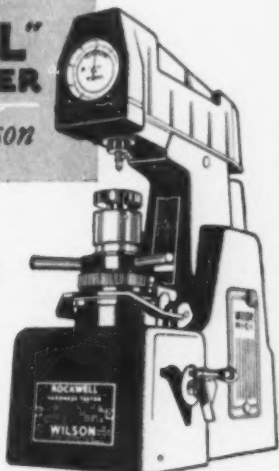
## **"ROCKWELL" HARDNESS TESTER**

*Made Only by Wilson*

### **Guardian of Specifications**

• Whether it's material, parts or tools—a product you buy or one you make—if hardness is one of the specifications, it's a very important one. A few points too hard or too soft might be the means of risking thousands of dollars in time and materials.

WILSON Field Service Engineers are equipped by training and experience to recommend the exact type of hardness testing equipment that will serve you best—make sure that it continues to be dependably accurate. Write us for information about any phase of hardness testing.



# **WILSON**

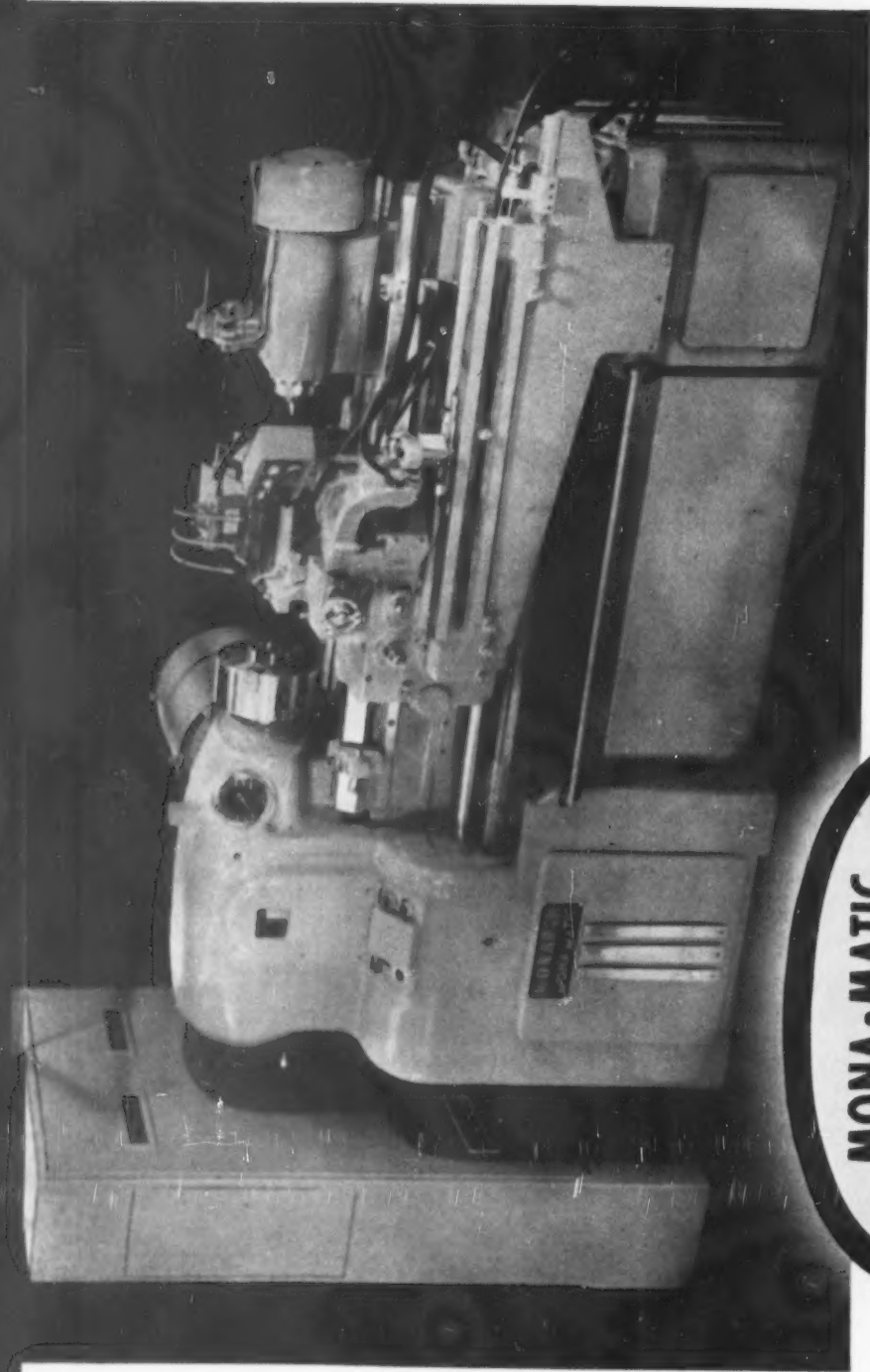
**MECHANICAL INSTRUMENT CO., INC.**

AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.

230-G PARK AVENUE, NEW YORK 17, N. Y.

**ACCO**





**MONA • MATIC**

or Multiple Tooling Methods

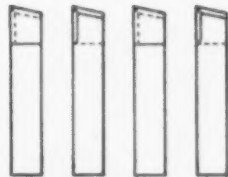
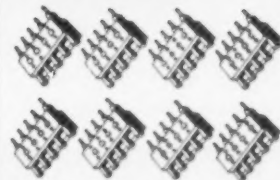
**.. WHICH?**

**LET'S TALK  
TOOLING COSTS!**



# MULTIPLE TOOL

# MONA-MATIC



Multiple Tool Automatics (battery of four)		Mono-Matic (battery of two)	
Production	120 hour	160 hour	
Cutting Tools	Cemented Carbide	Cemented Carbide	
No. of Tools	40	4	
Cost of Tools (including one replacement set)	\$4220	\$187	
Setup Time	28-30 hours	46 minutes	
Total Horsepower	80-120	40	
Floor Space	150-200% more than Mono-Matic		
Subsequent Grinding Operations			50% less time than multiple tool automatics

Would you rather pay \$187—or \$4,220 to tool up this job? It's just as simple as that.

On the typical steering knuckle job detailed at the left, two Mono-Matics, producing 33 1/3% more parts than four multiple tool automatics, require 36 less tools and only two standard tool blocks! And the multiple tool costs are figured on the basic minimum, two sets only. It might well be three or more sets, with correspondingly greater tool cost.

But bear in mind that lower tooling costs are not the whole story of the Mono-Matic's outstanding ability to cut your costs. You'll save on production time, on setup time, on accuracy, on power consumption and on floor space, too. For the full facts on how Monarch's famous Mono-Matics will outperform any ordinary multiple tool machining method, write for Bulletin 1804.



**Monarch**  
TURNING MACHINES

## COMPARATIVE CASE STUDY

Part—Steering Knuckle,  
SAE 1045, turned section—3 1/2" long,  
3/4" to 3" diameter

THE MONARCH MACHINE TOOL CO. Sidney, Ohio

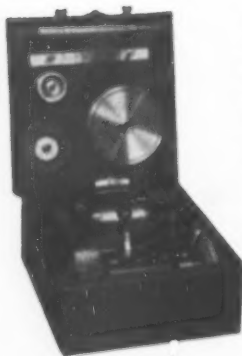
more profit...  
more work per man...  
per job...and no "per-haps"

For external and  
internal grinding



Model  
HLGE

## PRECISION LATHE GRINDER for precision production



Speed range up to 30,000 rpm obtained by various size pulleys adapts this grinder for a wide variety of work. Motor housing pivotally mounted on cast iron base; automatic take-up for belts; special locking device for holding belt tension; T-bolt mounting for radical and vertical adjustment. For mounting on lathes, planers, shapers, milling machines, boring mills in vertical or horizontal position. Can also be mounted on back of lathe; motor and grinding quill can be turned end for end.

Photo shows grinder and equipment in carrying case furnished as standard equipment.



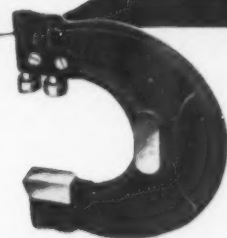
**CONTACT YOUR JOBBER**

he carries United States Electrical Tools in stock

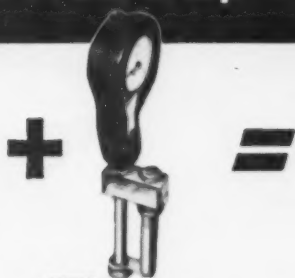
**The UNITED STATES ELECTRICAL TOOL Co.**  
CINCINNATI, OHIO

*Now*

# Dialize Your AGD Snap Gages



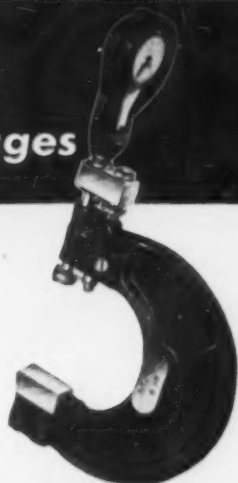
Your AGD  
Adjustable Limit  
Snap Gage



**STANDARD**

*Dializer*

*\*Patent Applied For*



Low Cost  
Dial Gage

## Easy to Install

Remove a pair of pins from an AGD Adjustable Limit Snap Gage . . . install this new STANDARD Dializer . . . and you have an indicating DIAL SNAP GAGE! It's as easy as that . . . and far less expensive than buying an equivalent dial snap gage.

Dializer No. 1 for frames 1-6  
Dializer No. 2 for frames 7-10  
Dializer No. 3 for frames 11-16

- ★ ASSURES ACCURACY by use of double reed principle.

## OUT of the LUXURY CLASS!

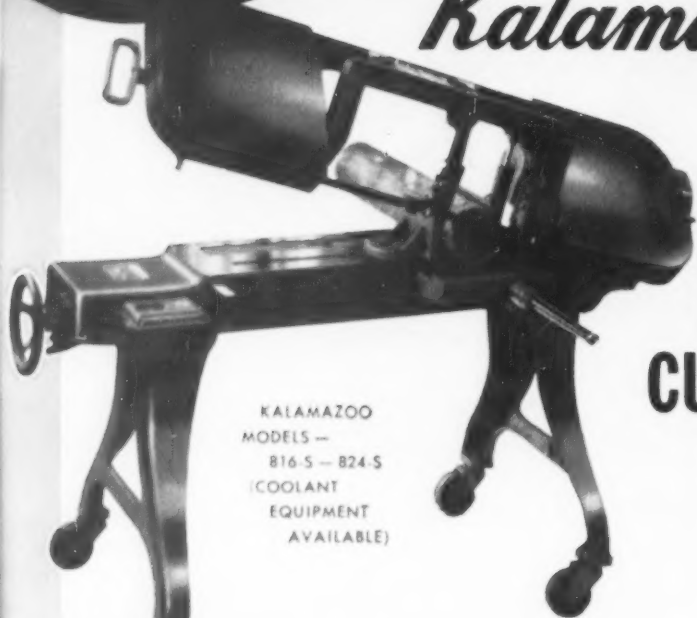
NO LONGER can you afford to be without the benefits of quantitative dial measurements. The STANDARD Dializer is priced way below an equivalent Dial Snap Gage. Even if you have to buy a new AGD snap to convert, you save on an overall basis.

- ★ EASILY INSTALLED in your AGD Adjustable Limit Snap Gages . . . any make.
- ★ CONVERTS any AGD Model — A, B or C, any size.
- ★ RANGE OF ADJUSTMENT is same as before dializing.
- ★ INDICATOR furnished with either .0001" or .001" graduations.

**STANDARD GAGE CO., Inc. Poughkeepsie, N.Y.**

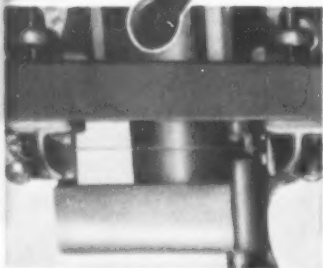
**SEE WHAT YOU'RE DOING!**

**Kalamazoo**



KALAMAZOO  
MODELS —  
816-S — 824-S  
(COOLANT  
EQUIPMENT  
AVAILABLE)

**METAL  
CUTTING  
BAND  
SAW**



Only Kalamazoo gives an unobstructed view of cut-off operations! The operator looks directly down into the cut... sees for himself how work is progressing, gets instant warning if blade adjustment is needed.

Full work view is one of many exclusive Kalamazoo features giving you faster, smoother, more accurate cutting of angle iron, tubes, bars, pipe. Handles 95% of normal cut-off operations. Leaves no burr, minimum kerf.

Sturdy, rugged, and portable. Has 4 Timken bearings. Blades can be changed in 30 seconds.

Write today for full details on lower-cost metal cutting... the Kalamazoo way.

**MACHINE TOOL DIV. *Kalamazoo* TANK and SILO CO.**

622 HARRISON STREET



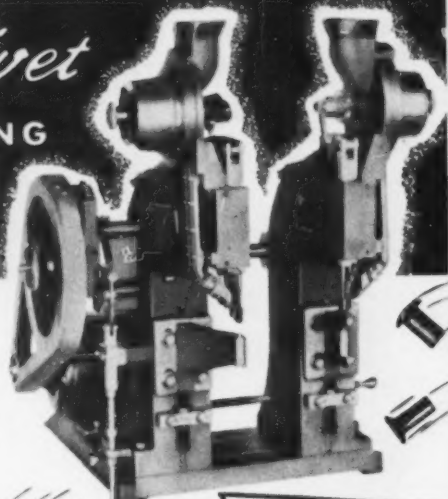
KALAMAZOO 16, MICHIGAN

# Chicago Rivet

## AUTOMATIC SETTING

### SLASHES UNIT COSTS!

If your product involves a fastening operation—wood to wood, metal to metal, fabric to fabric, composition to composition, or any combination of these—you can slash unit costs by increasing production volume with high speed Chicago Rivet Automatic Setters and Chicago Rivet tubular or split rivets. Four rivets are automatically fed, inserted and upset at one release of the foot pedal by the quadruple model Chicago Rivet Setter. Single, double and triple setters are also available.



Bench type  
Double Rivet  
Setter with  
Adjustable  
Riveting  
Centers

#### A Few Applications

AIRPLANE PARTS  
AUTOMOBILE PARTS  
BEAUTY PARLOR  
EQUIPMENT  
BED SPRINGS  
BELTS & BICYCLES  
CAMERAS  
CAN OPENERS  
CANVAS GOODS  
CARD TABLES  
CASH REGISTERS  
CLOCKS  
COFFEE POTS  
DOOR LOCKS  
ELECTRICAL PARTS  
FAN BLADES  
FARM IMPLEMENTS  
FILING EQUIPMENT  
FIREARMS  
FOLDING CHAIRS  
FURNITURE  
GARBAGE CANS  
HARNESSES  
INDUSTRIAL BROOMS  
INSTRUMENTS  
IRONING BOARDS  
KNIVES  
LAMPS  
LAWN MOWERS  
LEATHER GOODS  
LOOSELEAF BOOKS  
LUGGAGE  
MILK BOTTLE CRATES  
NOVELTIES  
POTS, PANS & PAIRS  
PULLEYS  
RADIO PARTS  
REFRIGERATORS  
RUBBER GOODS  
SEWING MACHINES  
SHOES & SKATES  
STEP LADDERS  
STOVES  
TELEPHONES  
TOASTERS & TOYS  
TYPEWRITERS  
VENTILATORS  
WASHING MACHINES



Quick change hoppers, available as extra equipment, enable some models to switch quickly from one size and style rivet to another. Nearly all models clinch grommets, eyelets, staples and Dzus fasteners and insert drive screws—all automatically.

#### FREE FASTENING CLINIC



If your product is small, send us an unfastened sample. If it's large, send us a sub-assembly. We will gladly analyze your fastening problem, recommend the type rivet and Chicago Rivet Automatic Setter needed and estimate production rates that can be set up on the job.

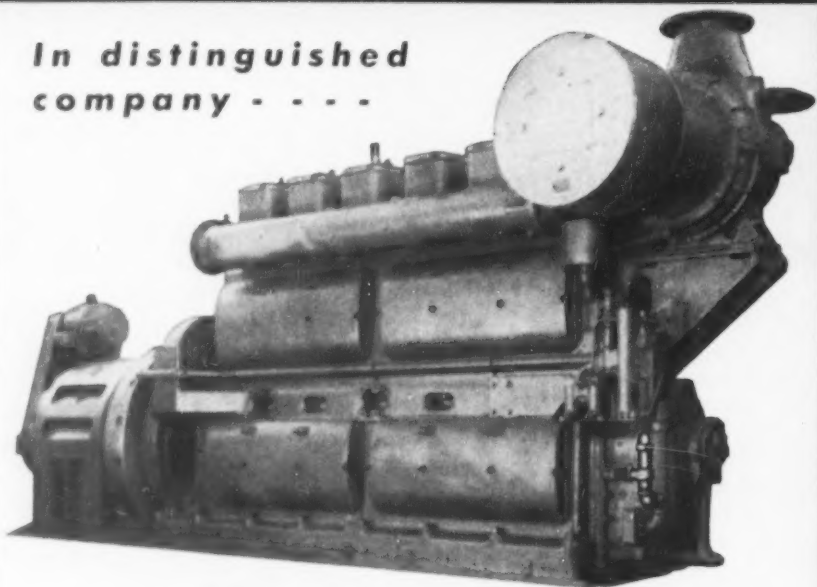


# Chicago Rivet

CHICAGO RIVET & MACHINE CO.

9621 W. Jackson Blvd., Hollywood, Ill.

**In distinguished  
company - - -**



## **RELIEF VALVES**

**on a 955 H.P. Diesel Engine**

**A** distinguished locomotive maker uses Fulflo 1 1/2" IPS piston type pressure relief valves to regulate lubricating oil pressures at 35 lbs. per sq. in. for lubricating bearings.

"Fulflo Valves are sometime seen . . . never heard."

The FULFLO VALVE is made with brass body and stainless steel pistons.

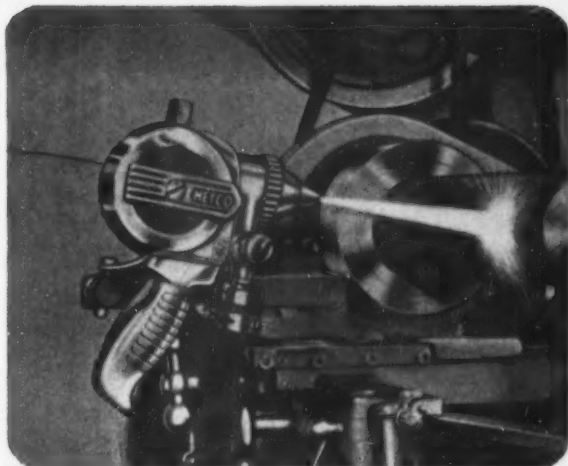
Consult the Fulflo technical staff on your problems. Write on your letterhead for the FULFLO MECHANICAL DATA BOOK.

THE



**Specialties Co., Inc.**

**BLANCHESTER, OHIO**



# **now** **a really** **low-cost** **metallizing** **installation...**

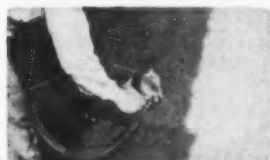
**with the new**  
**Metco L-Gun**



**Metallizing damaged journals on turbine shaft**



**Building up worn brake-drum**



**Metallizing protective coating on steel plate**

**New, low, compressed-air requirements... only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor... bring metallizing within reach of the small user.**

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- ▶ Save up to 90% of replacement costs on machine repair jobs.
- ▶ Do your own hard-facing.
- ▶ Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

**Sprays 33 Different Metallizing Wires**—With the new L-Gun you can spray .10, .25, .80 carbon steels, stainless; babbitts, brass, bronze, nickel, aluminum, tin, zinc; special hard-facing materials such as Metco-Weld H, and the new self-bonding Sprabond wire.

**It's Versatile**—Use the L-Gun machine-mounted or hand-held—it weighs only 4 lb. 2 oz. Do all kinds of metallizing work—shaft and bore build-up with harder, longer wearing metals; build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.

**Same High Quality as Other Metco Guns**—The low air requirements of the new L-Gun have been achieved without any

sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

**A Real Opportunity for the Smaller Shop**—Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users—large and small.)

**Free Bulletin or Shop Demonstration**—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.



The following names are the property of Metallizing Engineering Co., Inc.  
 METCO! • Sprabond wire • Metco-Weld

REG. U. S. PAT. OFF.

**METALLIZING ENGINEERING CO., INC.**

28-17 30th STREET



LONG ISLAND CITY 1, N. Y.

**R. J. McWaters**  
 Metallizing Engineering Co., Inc.  
 28-17 30th St., Long Island City 1, New York

☐ Please send me L-Gun Bulletin 55:  
☐ Arrange a free demonstration in my shop:

NAME \_\_\_\_\_  
 COMPANY \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
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# LW

## IT HAS BEEN DONE!

### WE ARE PRODUCING HIGH SPEED

# POWER HACK SAWS

FOR  
ONLY  
**\$250<sup>15</sup>**



Stops automatically on completion of cut. Automatic relief of saw blade on non-cutting stroke. 6" x 6" capacity using 10" x 14" blades. 12" x 3" clutch pulley. Pulley speed 120 r.p.m. Coolant pump base. Swivel vise for angle cuts. All steel welded base and table. V-belt drive. Rigid frame. Gravity feed. Length gauge. Expanding clutch. 3-speed (90 to 150 r.p.m.) V-belt motor drive arrangement, \$25.90, less motors. 1/2 H.P. 1725 r.p.m. motor recommended. Completely Motorized with Switch; Single Phase \$332.05; Three Phase \$338.05.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



ELECTRICAL BOX



ELECTRICAL BOX



DIVISION HEAD



RELIABLE



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## L-W CHUCK COMPANY

28 SO. ST. CLAIR ST.  
TOLEDO 4, OHIO

A typical  
cost-cutting  
DUMORE  
application

## "We can't afford thousands of dollars for special machines"

**"but no production unit we've seen approaches low cost of Dumore Handgrinders!"**

says C. A. Ewing, Supt. of Raush Nut & Mfg. Co., Cleveland. Using special fixture with adjustable table (cost \$50 - \$75) and mounting Dumore Series 8 or 10 handgrinder, Raush Nut deburrs up to 500 stainless steel hex nuts per unit per hour. Total cost per 100 including grinder, fixture, current, supplies and labor is less than 36¢.

**"Still Own Every Dumore Ever Bought"**

Raush Nut owns 30 Dumores, some as old as 15 years, uses them in tool room and maintenance, as well as production

... operated most of them 24 hrs. per day at peak production. No wonder Supt. Ewing says, "High speed and precision built into Dumore Grinders insures accuracy and trouble-free production!"

Ask your Dumore Distributor to show you, in your own shop, how Series 8 and 10 handgrinders can up your finishing output, slash your costs. Call him today or write for literature to: The DUMORE COMPANY, Dept. F-33, Racine, Wis.

# DUMORE

DH-1





## Ask the Man with Holes in His Head!

... to cut your boring costs

What'll it get you to ask about boring? Just this — lower costs. Lower costs through savings in time and money. Because "the men with holes in their heads" provide newer, faster, lower cost methods of boring. You may need special bars and special cutters. If so, they'll be designed for you. More likely the right standard Madison cutter in the right Madison bar can give you full production economy . . . and the Madison line of boring tools is broad enough to fit nearly any boring problem. Why not let Madison — experienced specialists in boring and boring only — cut your boring costs? Ask us. A brief letter will do it. No obligation of course.

### BETTER BORING TOOLS

Madison's two-bladed cutter provides generous chip clearance — permits faster cutting without overheating. It floats in a Madison bar, special floating tool holders are never needed. More holes per cutter and more regrinds per cutter. Cutters can be changed without disturbing setup. Tolerances to .0003. These and other Madison features cut your boring costs.

### MORE BORING EXPERIENCE

Literally thousands of boring jobs have been solved by Madison in the past thirty-five years. With this experience to draw upon, Madison can give you the right answer, sooner. Which means your savings from lower cost production begin sooner, too.

*Write for the information filled Madison Catalog. It is yours for the asking.*



# MADISON

MANUFACTURING COMPANY

DEPT. MM

MUSKEGON, MICHIGAN

**OLIVER OF ADRIAN**

# **Sweeping Preference for OLIVER DRILLPOINTERS**

• Confirmation of industry's approval of Oliver Drillpointers is reflected in the number of Oliver machines in America's largest plants.



## **510 OLIVER DRILL POINTER**

*A completely automatic machine that grinds a scientifically correct and theoretically perfect drill point on drills  $\frac{1}{4}$ " to 3" in diameters. (Equally accurate on 2, 3 or 4 flute drills.) No. 510 provides variable point angles and clearances.*

## **21 DRILL POINTER**

The Oliver No. 21 Drillpointer is easy to set, easy to operate, and produces an accurate point on drills from No. 57 to  $\frac{1}{2}$ ".

Features diamond dresser, vee belt drive, hand operated, bench type, ball bearing wheel spindle. The No. 21 will grind many types of standard or special drill points.

### **MAKE US PROVE IT!**

Send us a few of your drills. We will grind them free of cost and prove to you the efficiency of Oliver Drillpointers.

*Write for Literature.  
(No Obligation.)*

# **OLIVER INSTRUMENT CO.**

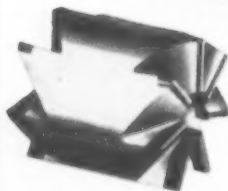
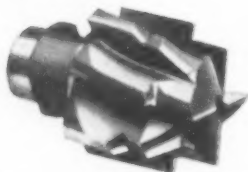
**1430 E. MAUMEE • ADRIAN, MICHIGAN**

AUTOMATIC DRILL GRINDERS  
TOOL & CUTTER GRINDERS—DRILL  
POINT THINNERS—TEMPLATE  
TOOL GRINDERS—FACE MILL  
GRINDERS—DIE MAKING MACHINES

# "ECLIPSE QUALITY"

**WHAT IT MEANS** IN TERMS OF EFFICIENCY AND PROFIT

*for You!*



**1. DESIGN SERVICE.** Eclipse engineers will design your cutters directly from part print. Your engineers will have more time to devote to other tool problems.

**2. MAXIMUM LIFE.** Eclipse engineering with 35 years experience behind it, assures cutter designs to give maximum life with minimum down time.

**3. MULTIPLE OPERATIONS.** Eclipse originated and developed multi-diameter cutters and its engineers are best qualified to design cutters to perform maximum operations at a single pass.

**4. ASSURED QUALITY.** Produced in the modern Eclipse plant with latest type equipment where quality is paramount and inspection rigid.

**CUTTERS:** H.S.S. and Tungsten Carbide Tipped—Multi-diameter—Inserted Blade—Center Cutting—Inverted and Down Drive—Double End Facers—End-Form—two piece Core Drills.

**HOLDERS:** Stop Collar—Bushing Guided—Adjustable length—Floating—Specials of all kinds.

*Also complete stock of Standard Holders, Cutters and Pilots.*

**ECLIPSE COUNTERBORE CO.**  
*Founded over thirty five years ago*

DETROIT 20, MICHIGAN

# Special Bargain: "The Works" in ONE OPERATION!



Wouldn't it be wonderful if you could get a shave, haircut, shampoo, singe, manicure and shine in one time-saving operation at lower cost?

But in metalworking, woodworking and plastics manufacture you often can—by combining all production steps following the rough grind right through the final polish into one operation. Brightboy does

it. Time-savings are as much as 50%!

In Brightboy, America's outstanding discovery in light abrasives, abrasive and rubber work simultaneously, **BURRING, CLEANING, FINISHING, POLISHING.** Brightboy gives you a unique, smooth-surfacing action that only perfect blending of abrasive and rubber can produce for finishing metals, wood, plastics, glass.

## What Abrasive-Plus-Rubber Brightboy Does

Bridges the gap between grind and buff in one operation; precision-works to close tolerances and can be shaped to contours;

polish; requires no before-use preparation or dressing, no skilled labor to handle it.

## Ask Your Dealer For The Time & Work-Saving Brightboy Catalog-Manual

Every production executive, every methods man, every bench worker should have it. Write the Brightboy Service Department on any production or methods problem where finishing is involved.

### BRIGHTBOY INDUSTRIAL DIVISION

Weldon Roberts Rubber Co.

Newark 7, N. J.

America's Pioneer Manufacturers of Rubber-Bonded Abrasives





# LEPEL

*offers a  
New*

**DOES ALL  
THESE JOBS**

*Faster, Better  
and Cheaper*

BRAZING, SOLDERING  
HARDENING, ANNEALING  
DRAWING AND  
MELTING

## LOW COST High Frequency HEATING UNIT

AT A PRICE SO LOW THAT NO MACHINE  
SHOP, TOOL ROOM OR LABORATORY  
CAN AFFORD TO BE WITHOUT IT!

### • SMALL and COMPACT

Conveniently operated on bench or table  
— no mounting necessary.

### • ECONOMICAL OPERATION

No special power installation  
required. Operates on  
110 volts, 60 or 50 cycle  
line at unity power factor.

### • FULLY

### GUARANTEED

Guaranteed for continuous  
duty cycle and stated  
performance.

### • LOW COST \$780

Complete unit with  
line connection f.o.b.  
and load coil factory



Unit illustrated brazing carbide tips to cutting  
tools. Shanks up to 1½" square can be  
satisfactorily brazed.

### WILL HEAT TO 1500° F.

1/8" steel rod 1" length in approx.	1 second
1/4" " " " " " " " " " "	3 seconds
3/8" " " " " " " " " " "	15 seconds
1" " " " " " " " " " " "	60 seconds

Will melt 4 ounces of brass or steel in 4 minutes.  
Equally well suited for heating of non-ferrous metals.



HARDEN



SOLDER

## LePel

HIGH FREQUENCY HEATING UNITS



BRAZE



MELT

LEPEL HIGH FREQUENCY LABORATORIES, Inc., 39 West 60th Street, New York 23, N. Y.



# PRECISION BORING... AT YOUR PRICE *with a* **MASTUR**

● **ACCURACY** to 0.0002" is the outstanding feature of MASTUR boring tools. They are designed to perform a wide range of rough and finish boring operations on milling, drilling and boring machines as well as automatics at a price you're willing to pay.

Three sizes of MASTUR tools are available for boring holes up to 15" in diameter. Shanks are interchangeable. Full off-set in either direction is feature of dovetail construction. High-carbon chromium steel adjusting screw is precision ground from solid and the dial is graduated into 50 divisions. These dial markings together with tool body calibrations assure accurate vernier readings up to 0.0002".

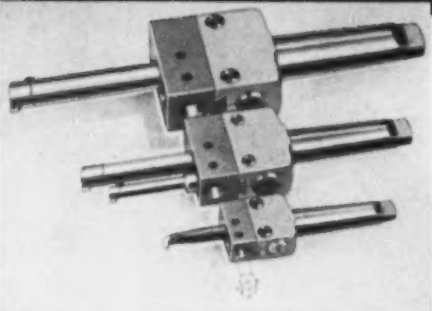
*Guaranteed unconditionally.* MASTUR boring tools unique construction provides a compact, durable and sturdy tool designed to give years of dependable operation under all shop operating conditions.

MASTUR No. 5 has 0 to 7" capacity.

MASTUR No. 6 has 0 to 11" capacity.

MASTUR No. 7 has 0 to 15" capacity.

All MASTUR boring tools utilize standard B&S and Morse tapers as well as straight shanks. Other shanks are available on request.



**PRICES START AT \$44.00**



Write today for  
catalog No. MPBH  
for complete data.



MAXWELL RECESSING tools  
are described in catalogs  
No. R and JF. Write today.

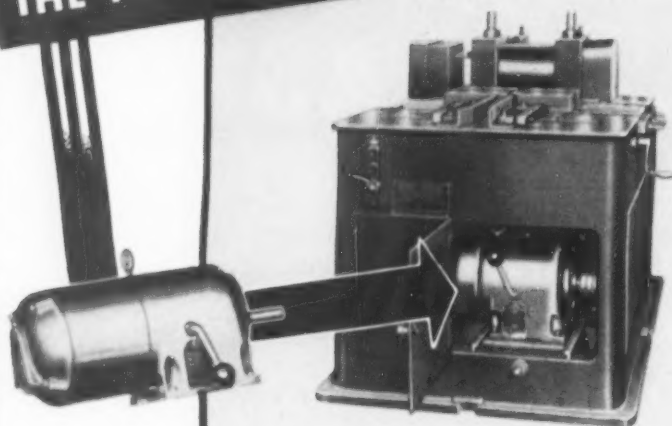
## THE MAXWELL COMPANY

327 BROADWAY  
BEDFORD, OHIO

**LIMA**  
**GEARSHIFT**  
**DRIVES SOLVE**  
**THE PROBLEM...**

**CONTINUOUS HEAVY  
 STEEL ROLLING  
 AND BEADING**

*of* **AT**  
*Low-Cost!*



Like many manufacturers and users of selective-speed drives, Merry Company, River Rouge, Michigan, chose LIMA GEARSHIFT DRIVES to power their rolling and beading equipment because of LIMA'S rugged dependability and trouble-free performance. The Merry Rolling and Beading Machine is of special construction to handle stock from 2" to 8" wide in continuous operation and is powered by a 5 hp, Type

R3A, 1200 rpm integrally mounted motor LIMA GEARSHIFT DRIVE, with a speed ratio of 4.15:1; 3.15:1; 1.85:1 and 1.00:1.

LIMA GEARSHIFT DRIVES are built in a complete range of sizes from 1/2 to 25 hp. If your selective-speed requirements come within this range—there is a LIMA DRIVE to suit your needs. Write us today . . . free bulletins upon request.

**LIMA**



**WRITE TODAY  
 FOR BULLETIN DB-1**

Representation in principal cities  
**THE LIMA ELECTRIC MOTOR COMPANY**  
 120 FINDLAY ROAD • LIMA, OHIO

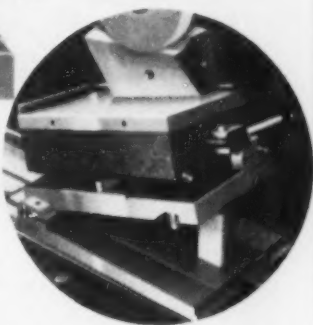




what could be  
more positive...

*or simpler?*

## The MAGNA-SINE for angular work



The Magna-Sine, used with standard gauge blocks, is the only positive shop method of making fast angular set-ups. Plus this angular accuracy, the work piece is held securely, without distortion, by magnetic attraction on a permanent-magnet chuck.

The Magna-Sine—except magnetic parts—is made of hardened, seasoned steel and all gauging surfaces are ground and lapped flat and square for positive accuracy from every set-up.

Set-ups are made by inserting standard

gauge blocks between the plates of the Magna-Sine. The proper blocks are indicated for all angles in the Table of Constants furnished with every unit. No dials to go out of adjustment; no scales to mis-read... no parts to move or go out of adjustment after the set-up is completed.

*Write for descriptive bulletin which gives full details and prices on these versatile units. Thousands are in daily use.*



OMER E.

*Robbins* COMPANY

*Manufacturers of the MAGNA-SINE and Other Precision Tools*

5722 Twelfth Street • Detroit 8, Michigan

Job File No. 194

# MALLEABLE NUT PRODUCTION

## Fully Automatic

CONTROLLED BY T-J CYLINDERS

10 TON  
CYLINDER

6 TON  
CYLINDER

40 TON  
CYLINDER

8 TON  
CYLINDER

All moving parts are controlled hydraulically by T-J Cylinders —on this Malleable Nut Production Machine designed and built by Roy Hays & Associates, Rockford, Ill., for the Wagner Malleable Products Co., Decatur, Ill.

It's *fully automatic*—the operator only places nuts in stations. Nine T-J Cylinders, 40 ton to  $\frac{1}{2}$  ton, help complete the job of cutting off sprue, sizing, boring, facing, chamfering and threading 2,500- $\frac{1}{4}$  std. pipe thread nuts per hour.



For your tough jobs of power movement—pushing, pulling or lifting—*save labor, speed production and cut costs* with T-J Air and Hydraulic Cylinders! Many standard sizes and styles... both cushioned and non-cushioned types... 100 lb. or 50,000 lb. Precision-built for long-life dependability. Write for latest catalogs. The Tomkins-Johnson Co., Jackson, Michigan.

FOR POWER MOVEMENT IN ANY DIRECTION



100 L.B. or 50,000 L.B.

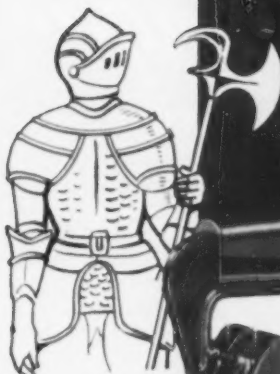
32 YEARS EXPERIENCE



### TOMKINS-JOHNSON

RIVETERS AIR AND HYDRAULIC CYLINDERS CUTTERS CLIMBERS

# OUT OF THE PAST THEY HAUNT US TODAY



Old and obsolete machines, like ancient warriors, belong to a bygone day. Good in their time, these machines of the past hamper production, increase costs, help your competitor.

Startling facts reveal the gains you make with modern, late model RACINE Metal Cutting Machines. Designed for today — they cut costs for tomorrow. Give you clean, accurate work and economy in operation. Capacities 6" x 6" to 20" x 20". Single purpose and automatic bar feed production units.

We'll prove our point — without obligation to you — if you will write for FREE production estimates on your specific metal cutting jobs. Address Racine Tool & Machine Company, 1770 State Street, Racine, Wis.



## RACINE

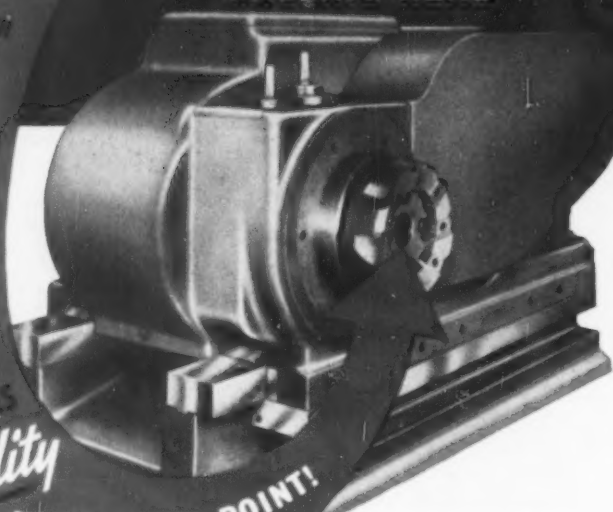
STANDARD  
FOR QUALITY  
AND PRECISION



# For **FASTER** Production Milling....

The NEW

## MILLING HEAD



BALANCED SPINDLE GULL  
AND BEAR CONSTRUCTION

ALL GEARS SHIP ON  
INTERIAL WITH SHAFTS

MACTIVE STEEL GULL WITH  
ADJUSTMENT BY ACME  
THREAD

HEAVY DUTY, TAPER ROLLER  
BEARING SUPPORTS

WIDE FACED, HEAVY DUTY  
HELICAL BEARING

FLYWHEEL ACTION FROM  
LARGE SOLID DRIVING GEAR

HARDENED, GROUND  
STEEL WAYS

THESE FEATURES  
GIVE *Rigidity*

AT THE TOOL POINT!

CAPACITY up to 50 h. p.

Rigidity is needed at the tool point, and the new M. & M. milling head meets this requirement more than amply. Massive, balanced construction prevents vibration, permits heavier cuts and faster feeds, which result in

increased production and longer tool life. This new head can be adapted to special production milling machines of our design, which may also combine additional operations into transfer type or trunnion type machines.

*Our representative will help you with your problems — no obligation.*

Manufactured by

**THE MOTT & MERRYWEATHER MACHINERY COMPANY**  
715 PENTON BUILDING • CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION WITH ACCURACY MACHINES AND EQUIPMENT



**A NEW** time & money saver...

## The NEW Blanchard Wheel Holder Eliminates Sulphuring

Now you can eliminate sulphuring when mounting cylinder and sectored wheels on Nos. 11 and 18 Blanchard Grinders. The new Blanchard Wheel Holder makes wheel mounting a matter of minutes, thereby increasing productive grinding time. Specially designed taper spring clamps, actuated with a wrench, hold wheels solidly and safely in the new ring-type holder. Now there is no reason for not using the right wheel for every job — to get maximum results from your Blanchard every time. Write for new Bulletin giving complete details.

for mounting **BLANCHARD** wheels

Whether you use the new Blanchard Wheel Holder or sulphur, you can't go wrong if you use Blanchard Grinding wheels. 25 years of research, design and manufacturing experience stand back of every Blanchard cylinder, sectored and segment wheel. When you consider production and overall economy — "there is no better wheel for a Blanchard Grinder than a Blanchard Wheel." Write for Blanchard Wheel Catalog.

PUT IT ON THE **BLANCHARD** THE BLANCHARD MACHINE COMPANY  
64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

ON NO. 11  
BLANCHARD



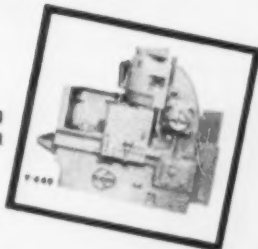
ON NO. 18  
BLANCHARD

CYLINDER

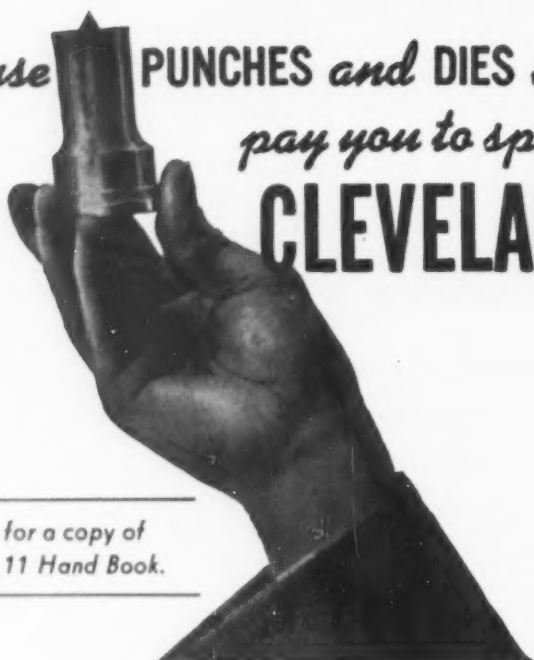
SECTORED



NO. 18 BLANCHARD  
SURFACE GRINDER



*If you use* **PUNCHES and DIES** *it will*  
*pay you to specify..*  
**CLEVELANDS**

A black and white photograph of a hand holding a cylindrical punch tool. The hand is positioned vertically, with the thumb and index finger gripping the tool. The tool has a hexagonal base and a smooth, tapered body. The background is plain white.

---

*Write for a copy of  
our No. 11 Hand Book.*

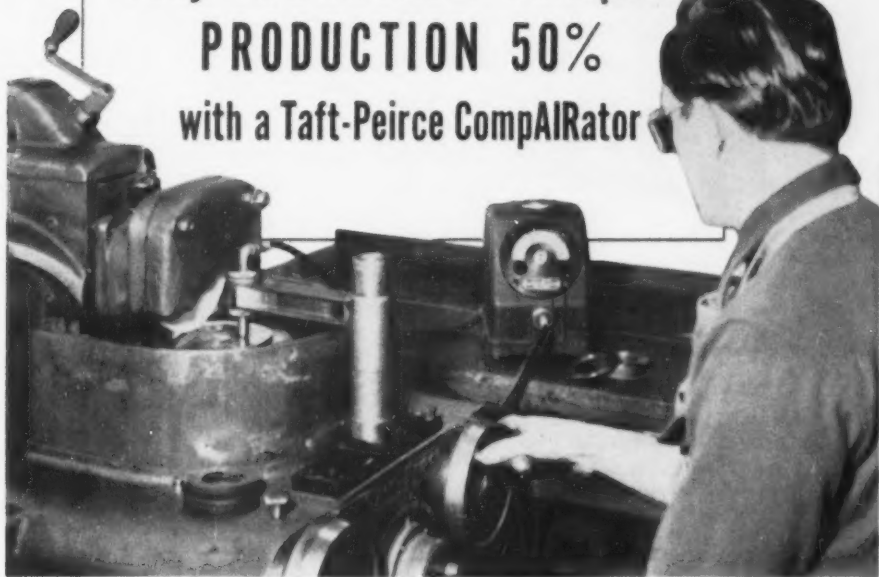
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We can furnish you with dependable Punches and Dies for all makes of Power, Hand or Foot Punching Machines and Presses, immediately from stock, in 29 sizes ranging from 5/32" to 1 1/2" punching diameter. Special sizes and shapes to meet particular requirements are made to order promptly.

If you are interested in economy, investigate the savings offered by The Cleveland System of Standardization for Punches and Dies by which it is possible to punch various sizes of holes by the use of the same nut and punch stem.

<b>PUNCHING TOOLS &amp; DIES</b>	<b>THE CLEVELAND</b> PUNCH & SHEAR WORKS CO. U.S.A. Established 1880	<b>FABRICATING TOOLS</b>
OFFICES AT: NEW YORK... CHICAGO DETROIT... PHILADELPHIA PITTSBURGH	<b>POWER PRESSES</b>	CLEVELAND 14, OHIO

They INCREASED Accepted  
PRODUCTION 50%  
with a Taft-Peirce CompAIRator



**Problem:** To produce circular cutters of high speed steel. Specifications: O.D.,  $3\frac{1}{4}$ "; thickness, .009",  $+.0000$ ",  $-.0001$ "; surface finish, not to exceed 8 micro-inches.

To avoid high spoilage and maintain production, highly accurate on-the-machine gaging was required. Mechanical devices were ruled out due to the adverse effects of sludge accumulation and vibration.

**Solution:** A single-nozzle air gage fixture was built and attached to the saddle of a Taft-Peirce 6" Rotary Grinder. The nozzle could be swung into gaging position over the work on the chuck. A flexible hose connected the fixture and a Taft-Peirce

CompAIRator, located beside the grinder. Once settings were established with master size blocks, the operator merely watched the CompAIRator dial as he fed the finish cut. When the pointer moved within the tolerance span indicated on the gage dial, he knew that the proper size had been reached.

**Result:** Production was increased directly by 25%. Spoilage was reduced from 20% to 1.5%. The final result was a 50% increase in accepted production.

There are similar jobs where on-the-machine gaging with a Taft-Peirce CompAIRator can cut your costs. Write today for a copy of the new CompAIRator bulletin.

**THE TAFT-PEIRCE MFG. CO.**

WOONSOCKET, RHODE ISLAND



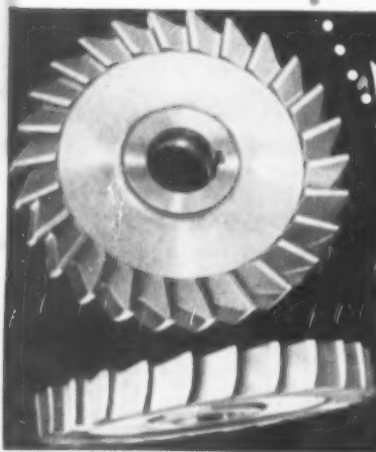
# 150 to 425

**YES...** in a recent comparative performance test, 150 Aber "Curved Tooth" milling cutters out-performed 425 conventional type milling cutters — a  $2\frac{1}{2}$  to 1 increase at **NO EXTRA COST!**

Designed and developed specifically for production men who look to **NEW** tool designs to reduce top-heavy metal cutting costs, Aber "Curved Tooth" milling cutters operate at speeds 10% to 25% faster than standard straight tooth milling cutters in addition to providing smoother finishes and



close to tolerance operations. Utilizing the most outstanding tooth design developed in the past decade, Aber Engineering Company produces a complete line of quality milling cutters featuring the "Curved Tooth" principle.



**A TYPICAL ABER "CURVED TOOTH" PERFORMANCE**

**OPERATION:** Milling flats on plate. Slotting and side milling parallel sides.

**MACHINE:** Cincinnati 3 Spindle Mill.

**TOOL SETUP:**

- 1) 8" H. and L. H. Shear Side Milling Cutter
- 1) 8" H. Half Side Milling Cutter
- 1) 8" H. Half Side Milling Cutter

Feed: 10-12

**PERFORMANCE:** 16-17 hours between grinds. Best previous practice with conventional, straight tooth H. S. S. milling cutters was 6-12 hours between grinds.

**ABER**   
**ENGINEERING WORKS INC.**  
 WATERFORD, WISCONSIN

# 72 hrs. of heat treatment

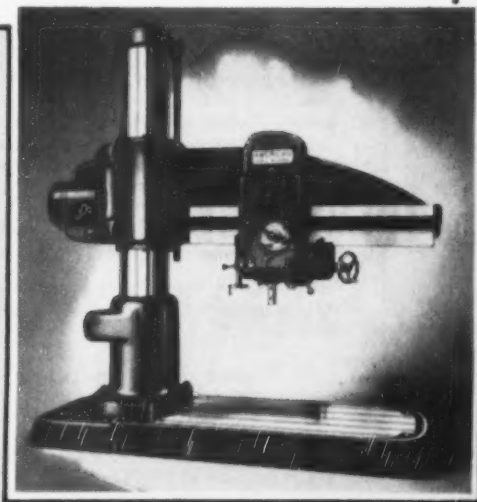
... required to produce the ultimate  
in radial drill spindles

"AMERICAN" Radial Drill Spindles are made of nitralloy. 20 hours of heat treatment from rough to finish, then 72 hours of nitriding are required to produce the wear-resistant spindles used in these radials.

Both the spindles and sleeves are nitrided to 110 degrees scleroscope. This is harder than some grades of cemented carbide. The sleeve is finish honed and the spindle ground and then diamond lapped to a sliding fit in the sleeve. Because of the lack of affinity between these two hard surfaces the clearance between them may be reduced to the very minimum, which in this case is .00025".

This results in the greatest possible stability, resulting in an ideal construction especially for accurate boring operations, which demand a high degree of smoothness and rigidity of the spindle.

This is but one of the super features that make the "AMERICAN" Hole Wizard an outstanding investment.



THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio U.S.A.

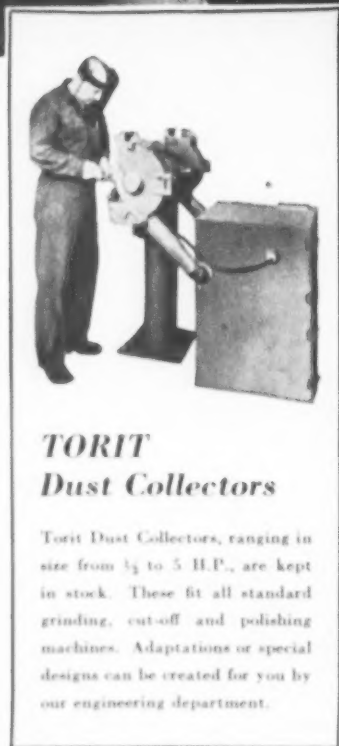
*Lathes and Radial Drills*



Should you take a chance?



*The odds on  
filling an inside  
straight are 11 to 1.*



### **TORIT Dust Collectors**

Torit Dust Collectors, ranging in size from  $\frac{1}{2}$  to 5 H.P., are kept in stock. These fit all standard grinding, cut-off and polishing machines. Adaptations or special designs can be created for you by our engineering department.

### **Take no chances with abrasive dusts. Use TORIT DUST COLLECTORS**

No abrasive dusts will damage expensive equipment when machines are equipped with Torit Dust Collectors. No extensive piping obstructs lighting arrangements. Your production layout remains undisturbed, because compact, self-contained Torit Dust Collectors fit into odd spaces and require little room. They are reasonably priced, and operating and maintenance expenses are low.

Write us and learn why Torit Dust Collectors are ace high with so many industries.

## **TORIT**

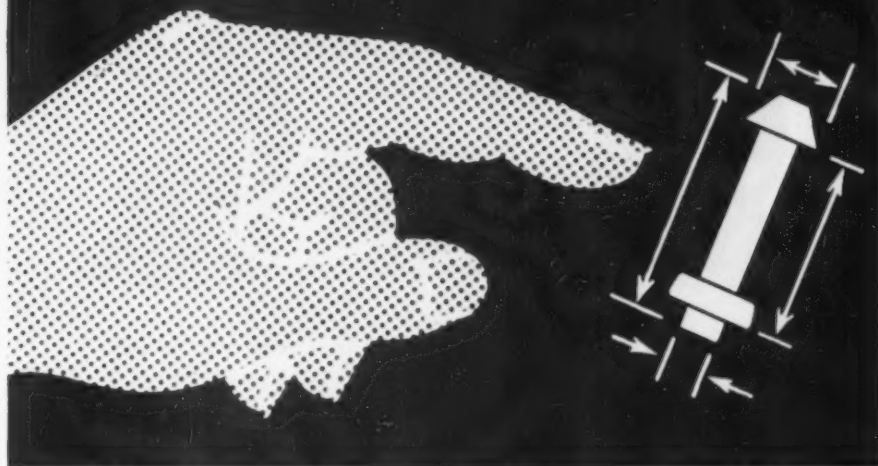
### **Manufacturing Co.**

296 Walnut St., St. Paul 2, Minn.

*P.S. Ask for latest Torit Catalog*

# SPECIFY **Hassall**

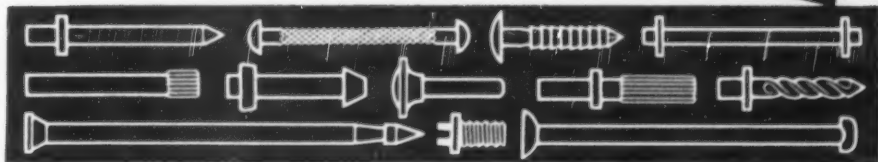
## specially engineered fasteners



Hassall cold-headed fasteners can improve your products and save you money, even on short runs. Send us your specifications for your nails, rivets and screws...in diameters from 1-32" to 3-8"...lengths up to 7"...in any workable metal...in practically any finish. Your inquiry will be handled promptly. Ask for free catalog.

### **JOHN HASSALL INC.**

394 Oakland Street, Brooklyn 22, New York



# AMES

*From Rubber Sheets to Sheet Steel*



## AMES DIAL THICKNESS GAUGES

give impersonal,  
accurate results

**FASTER**



When you want to measure the thickness of either hard or resilient sheet materials you'll find one of these Ames Dial Comparators best for the job.

**Ames No. 2** Dial Comparator is used for measuring non-yielding materials — sheet metal — hard rubber — glass. Compact and steady, it is ideal for bench use. The 2" dia. table is adjustable to bring pointer to zero. Fingertip lever raises contact for rapid insertion of pieces. Release lever and read dial for a truly impersonal and accurate result.

**Ames No. 2W** Comparator is similar to the Ames No. 2 but is fitted with a dead weight for standard measuring of resilient materials — sheet rubber — paper — plastics — etc.

Both gauges are available with dial graduations in .001", .0005", .0001" and .01 mm. Write for full details.

*Representatives in  
principal cities*

**B. C. AMES CO.**

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# MODERN Machine Shop

JUNE, 1950

Vol. 23, No. 1

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**By Herbert Chase**

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**By Graydon R. Mace**

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**By John E. Hyler**

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## **Look Ma — No Hands!**

**By Clifford W. Kennedy**

In this article Mr. Kennedy tells about a screw machine department that is set up to operate without the aid of inspectors. Page 194.

## **How Good Is Your Merit Rating System?**

**By Edmund Mottershead**

The author recommends that management in the interest of tightening up weak spots in its organization should periodically review its merit rating system. Page 208.



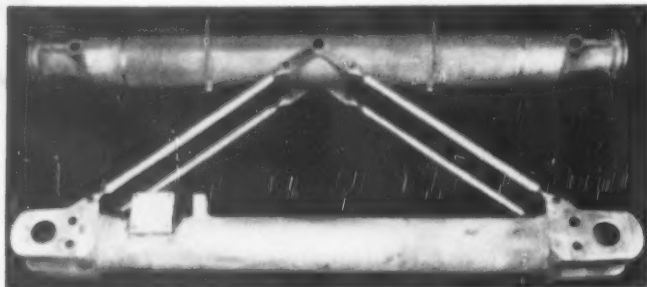
# Quality Control of Flashwelding

**Consistently good welds are produced at Northrop Aircraft by following tested and standardized techniques.**

By GILBERT C. CLOSE

THE use of flashwelding in the fabrication of primary structures in airframe production made necessary intensive research into the process in order to establish methods of quality control that would result in consistently good welds. The fact that this research achieved the desired results is well evidenced by the number of flashwelded primary structures now used in airframe production and emphasized by the additional fact that failure of the flashweld under operational loads could endanger the airplane, its passengers, and its crew. It is thus obvious that any industry desiring to use flashwelding in quality production could do well by patterning their process controls after those used by the various airframe companies.

The process engineering department at Northrop Aircraft, Inc., under the direction of T. E. Piper, well-known process engineer, made special efforts to develop flashweld quality control methods that would not only assure consistently sound welds, but would facilitate production and minimize operator experience requirements and the chance for human error. Consistently good welds are produced at Northrop by following tested and standardized techniques, and the human element is reduced to a minimum by using tabulated data to control process variables. A flashwelding specialist in the process engineering department, S. P. Jenkins, maintains constant vigilance over all flashwelded assemblies from the design stage,



▲  
Complicated spar assembly fabricated almost entirely by flashwelding. This is a highly critical aircraft component and a high degree of flashweld quality control must be exercised during its welding.

Proof-loading flashwelded fittings on an airplane part. Such proof-loading is a necessary part of a flashweld quality control program.



through production, inspection, and delivery to the assembly lines.

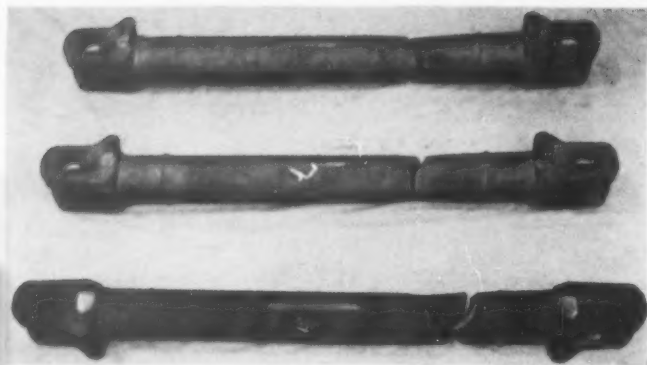
Flashweld quality control is a continuous process. For optimum results,

it must start with actual design of the part to be flashwelded. A flashweld specialist should consult with the designer to make sure that the part and the alloys used are adaptable to flashwelding, that blueprint dimensions of part components fall within the operating ranges of available flashwelders, and that subsequent available inspection and proof loading techniques can be used. Fitting the part to available equipment from the capacity, quality, and production speed standpoints is the first major step in obtaining maximum process efficiency.

Once a part has been designed to meet these prior specifications, the actual work of production quality control begins. At Northrop, the duties and responsibilities of flashweld quality control are divided between four manufacturing divisions: (1) Production; (2) Inspection; (3) Maintenance; and (4) Process Engineering. Actual control, of course, is vested in process engineering, but cross-checks between the other divisions provide a large amount of non-supervised control in the fabrication of production parts.

Process engineering control of flashwelding may be divided into five major activities: (1) To supervise and approve the qualification and certification of all flashweld machines, and to issue an approved operation card for each machine; (2) To furnish information for machining of test specimens when and as required; (3) To test all specimens for qualification, certification, and production testing control, and to circulate these test reports to the proper departments. (At Northrop, these include the salvage, production inspection, materials review, precision inspection, and, flashweld production departments); (4) To plot graphs of machine control settings for use by machine operators, and (5) Make all necessary contacts with authorized procurement inspectors.

Of course, when questions arise that do not fall within the foregoing specified activities, it is the responsibility of process engineering flashweld specialists to seek the answer, and all research in regard to flashweld production is carried out by process engineering personnel.



In these specimen aircraft spars tested to destruction, note that all failures occurred outside the weld plane. This is an indication of a good weld accomplished with a well adjusted flashwelding machine.

The duties and responsibilities relegated to the flashweld production department include: (1) Establishment of certification of welding schedules on each machine for every gauge and type of material. These certifications are established under the supervision of Process Engineering; (2) Record on the operation card supplied by Process Engineering the shop order and serial numbers, number of parts welded, date, and initial of the operator; (3) Spot check cleanliness and blueprint dimensions of detail parts; (4) Remove rust preventive oil prior to flashwelding; (5) Clean or change flashwelder dies whenever quality of work is affected; and (6) Check all flashwelds during production for visual appearance, concentricity, angularity of weld, and unusual welding conditions, and identify all bad welds with red lacquer.

The supervisor of the flashwelding department is charged with having an adequate supply of test coupons and flashwelder dies on hand at all times and with contacting Process Engineering when it is impossible to obtain satisfactory machine operation using the certified settings.

The inspection department must

inspect all specimen parts for visual defects, alignment and concentricity. All flashwelded assemblies must be held by the inspection department until the Flashweld Test Report has been approved by and received from Process Engineering.

The factory maintenance department, aside from routine maintenance, must break and clean all secondary flashwelder electrical connections after a specified period of operation.

An analysis of the above division of duties and responsibilities indicates at once the number of cross-checks used to maintain quality and to prevent defective welds from entering on the assembly line. The paper work involved makes it easy to trace reoccurring defects to their source. The rule against changing certified machine settings to obtain a better weld without first notifying Process Engineering so that an investigation can be made has proved very effective in maintaining weld quality. In most such cases, it is subsequently discovered that the certified machine settings are not the cause of a run of poor welds.

In actual operation, the Northrop flashweld quality control program can be divided into seven specific categor-

verify that coupon gauge and alloy correspond to the parts being welded, and must

ies of action: (1) Certifying the flashweld machines for each type and cross-section to be welded; (3) Preparation of materials for flashwelding; (3) Preparation of test coupons; (4) Operation of flashwelding machines; (5) Inspection procedures; (6) Reworking of flashwelded assemblies; and (7) Tooling flashwelder dies.

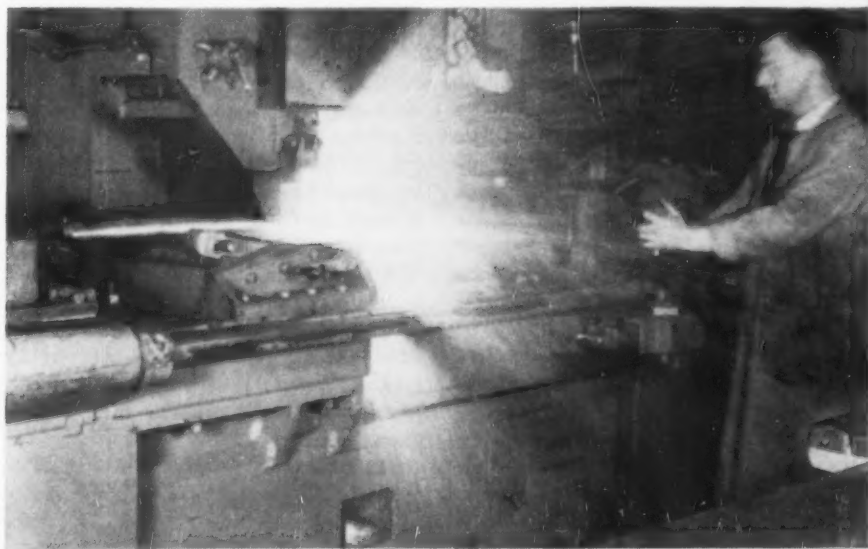
The initial data for determining flashwelding machine certification settings are obtained from chart curves established from previous extensive research by process Engineering. When the correct settings have been established, ten test specimens are welded. Flash metal is removed from these specimens on the outside to from 0.01 to 0.03 inch above the surface.

All ten specimens are then tested in tension in accordance with Specification QQ-M-151. Prior to testing, all specimens are heat treated to provide

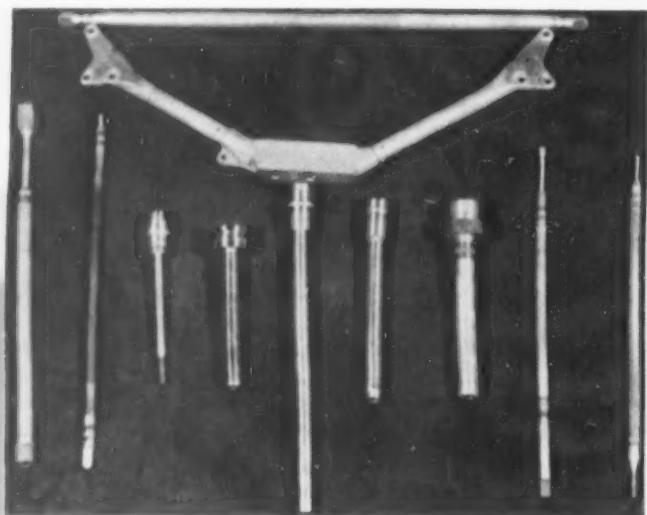
for a tensile strength of 160,000-180,000 p.s.i. or to the final heat treated condition of the production parts as specified on the blueprint, whichever is higher. For joints tested as whole specimens, three of the specimens are notched at the weld line.

No specimen tested as a whole specimen shall fail in the weld. Partial weld-plane failure in the heat treated whole specimens is not considered weld failure when fracture in the weld plane does not exceed 25 per cent of the weld area and is accompanied by visual necking down of the parent metal.

The notched specimens shall be free of cracks, porosity and oxide inclusions when subjected to metallographic examination. If the notched specimens do not fail in the weld-plane despite the notching and heat treatment, the weld is considered as sound and free from injurious defects.



Flashwelding a nosewheel shock strut on a 400 kva flashwelder. Machine adjustments are critical and must be ascertained before production parts are produced. Ascertaining machine settings is a part of the quality control program.



Typical flashwelded assemblies ready for use.

light rust preventive oil.

In the welding of test specimens, test coupons are used when possible instead of actual production parts. Of course, the weld area and alloy of the test coupon must be identical with that of the pro-

duction part. When the flashweld test specimens cannot be tested as whole specimens, the entire joint is cut into strip test coupons as per instructions of Process Engineering. The average strength of all the coupons from each specimen shall not be less than the minimum p.s.i. of the parent metal strength of the production part.

When all ten specimens pass the foregoing rigid tests, the machine settings used are entered on an operations card covering the specific part to be welded and are certified by Process Engineering. One of these operations cards is furnished with each blueprint of the part to be produced.

In preparation of materials for flashwelding, it is specified that all paint, plating, oxide scale and impurities of any kind be removed for a minimum of three inches from the ends which are to be welded. This cleaning must take place prior to delivery of the detail parts to the flashwelding department. The cleaned areas must be rinsed, dried, and then given a coat of

production part. Minimum length of the test coupons (tubes, bars, and so on) must be 6 inches. Normalized material may be substituted for annealed material or for other material heat treated to provide for a tensile strength of 125,000-145,000 p.s.i. Welding edges of the coupons must be machined so that the chamfer and face angle are the same as the production part. Cleaning of the test coupons prior to welding must be accomplished in the same manner as for production parts.

In actual flashwelding, the machine is first set up according to the instructions on the approved operations card. No deviations are allowed. The contact areas on all dies must be thoroughly cleaned before insertion of the die in the machine. A check of the setup is then made by welding three test specimens and one production part. The three test specimens are then visually checked for (1) angularity; (2) telescoping; and (3) general appearance. The welded production part is measured and checked for alignment. If



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there is any sign of surface burning or pickup, the dies must be changed or re-cleaned.

During production welding, after each 50 welds, a test specimen is welded or one production part is set aside for subsequent testing. When the lot

tion department. Flash is removed from all production parts as specified on the drawing prior to any further processing and before magnetic inspection.

All flashwelded assemblies are inspected for full compliance with blue-

NORTHROP AIRCRAFT, INC.							
PROCESS ENGINEERING				LAB. NO.			
				DATE			
FLASHWELD TEST REPORT				P. R. T.			
DWG. TITLE							
DWG. NO.				STD. DWG. NEXT ASSEM. NO.			
MATERIAL DESCRIPTION							
HEAT TREATED				AS WELDED <input type="checkbox"/>			
SHOP ORDER NO.							
SERIAL NO.							
NO. OF PARTS							
MODEL NO.							

SPECIMEN	WELD NUMBER	DIAMETER	THICK	AREA	LOAD	PSI	FAILURE

SATISFACTORY ☐
UNSATISFACTORY ☐

Flashweld Test Report used by Northrop Aircraft, Inc.

to be welded is less than 50, the last part of the lot is set aside. The first three test specimens and the parts set aside during production welding are then heat treated to the final condition of the production parts, the flash is removed as specified on the production drawing. These parts are then forwarded to Process Engineering and tested in tension in accordance with Specification QQ-M-151. Results of this test are then forwarded to the inspec-

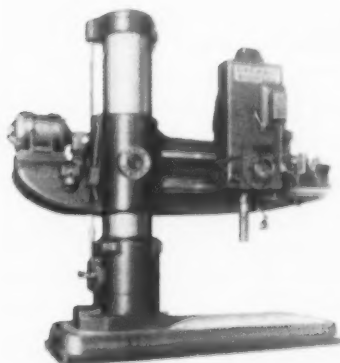
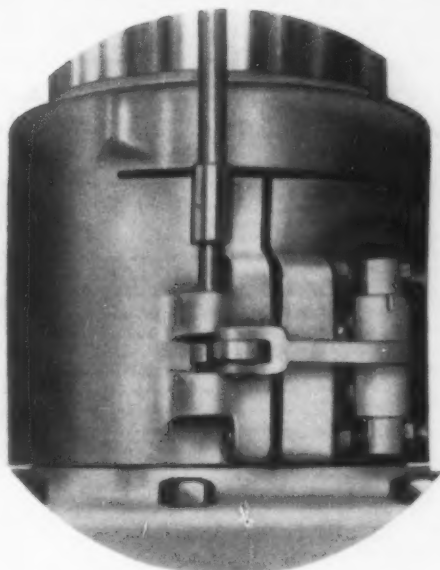
tion department and then magnetically inspected. Parts with major defects (cracks or telescoped welds) are rejected at once. The angular misalignment of the welded joints shall not exceed 0.010 inch per inch of length up to a maximum of 0.030-inch total runout. The alignment tolerances for sheet or tubing wall thickness of 0.080 inch and less shall not exceed 0.008 inch. For sheet or wall thickness greater than 0.080 inch, the misalignment of the

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thickness shall not exceed 10 per cent of the nominal section thickness up to a maximum of 0.030 inch. Misalignment must be measured at or near the plane of weld before the flash is removed. The misalignment in bars shall not exceed 5 per cent of the diameter

part is turned over to Process Engineering for further testing and a report. No flashwelded assemblies are permitted to leave the inspection department until the test report covering the original three test coupons and the production welded test parts is received.

FLASHWELD OPERATION CARD					
Material Description _____					Dwg. Title _____
Machine to be used _____					Dwg. No. _____
Tooling to be used _____					Process Engineering Approval _____
Area of cross-section at weld (Sq. in.) _____					Tentative _____ Date _____
Final Die Space _____					Final _____ Date _____
Total Loss per Weld _____					
Cam or Template No. _____					Dial Setting _____
Upset _____					
Speed Setting _____					
Transformer Tap _____					
Current Off _____					
Additional Machine Settings - To be made in the Order Given:					
1. _____					
2. _____					
3. _____					
10. _____					
Sketch of Drawing _____					
ORDER NUMBER	SERIAL NUMBER	NUMBER OF PARTS	DATE	OPERATOR	INSPECTION SET-UP CHECK

Flashweld Operation Card used by Northrop Aircraft, Inc.

or thickness when measured at or near the plane of weld prior to removing the flash.

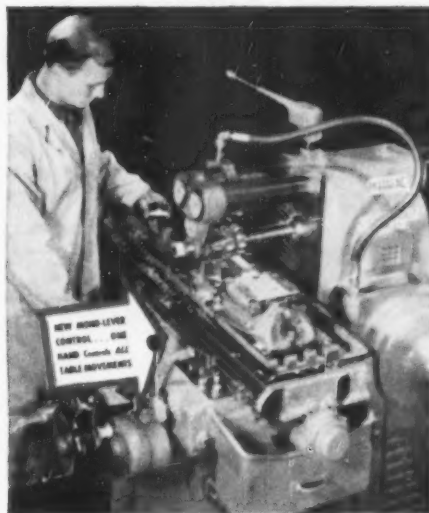
Proof load testing of flashwelded parts is used only when called for and the amount of proof load is specified on the blueprint. When indications are found during magnetic inspection, when die burns are visible on the part, or when there is visual evidence of non-symmetrical weld geometry, the

part is turned over to Process Engineering.

In the straightening of flashwelded assemblies, the minimum distance between the weld and point of pressure application must not be less than one-half of the diameter or thickness of the flashwelded section. Blueprint specifications must be fully observed in re-welding any assemblies. Component segments of assemblies which are to be rewelded shall be completely identi-

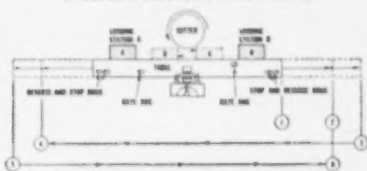
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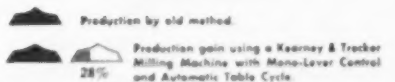
HOW JOB IS DONE  
USING AUTOMATIC TABLE CYCLE AND MONO-LEVER CONTROL



1. Operator loads (A) and engages Mono-Lever. Table advances in rapid traverse to point of cut on workpiece (A) at (2).
2. Feed dog changes rapid traverse to selected table feed for cut on (A). Operator loads at station (B).
3. Upon completion of cut stop and reverse dogs reverse table in rapid traverse to point of cut on workpiece (B).
4. Feed dog changes rapid traverse to selected table feed on (B). Operator unloads and reloads at Station (A).
5. Stop and reverse dogs reverse table in rapid traverse to point of cut on workpiece (A).
6. Cycle repeats from (2).

Diagram shows how operator set up table for automatic reciprocal milling operation. He engaged the Mono-Lever once for entire run. Machine required no further attention other than loading workpieces.

### COMPARE



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- 3 Under favorable conditions, several jobs done on these machines have shown savings like this!

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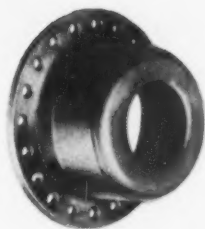
SOLO THROUGH SELECT INDUSTRIAL DISTRIBUTORS

fied so that mating parts can be easily assembled and rewelded.

Materials used at Northrop for making flashwelding dies must conform to Resistance Welder Manufacturers' Association Class II, Group A specifications.

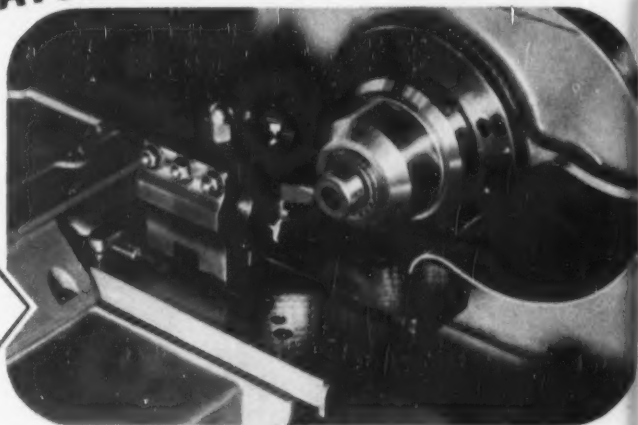
In brief summary, a quality control program for flashwelding as outlined above and in use at Northrop Aircraft, Inc., may seem somewhat cumbersome in the explanation; however, in actual operation, the program is streamlined to a point where production can progress unhampered. In fact, due to the production of consistently good welds and elimination of the time, effort and cost dissipated in faulty welds, overall efficiency and production are better than could be expected in trying to produce primary, highly stressed and critical assemblies with less rigid controls.





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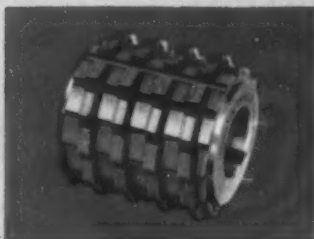
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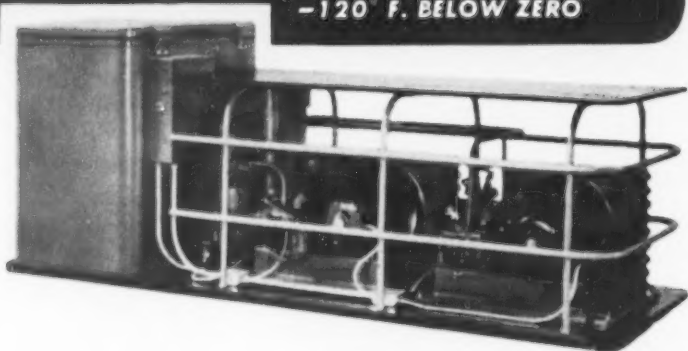
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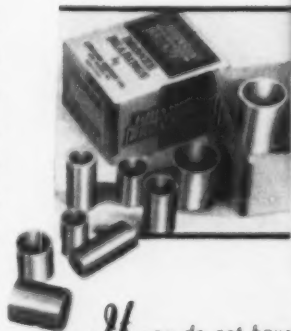
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# Method For Measuring Hob Tooth Wear

**Case studies reveal that hob life may be increased through use of careful testing method on each production job.**

**H**OB wear is such a complex subject that there is probably a different answer to each individual problem. Hob wear depends not only upon feed and speed, material of blank, pitch, coolant, and so forth, but also upon such things as the direction of shifting and the condition of the ma-

chine. No attempt will be made to explain how much and what type of wear you may expect on your job. Our purpose is to show a method by which the various types of wear can be checked and compared. You will then be in a position to obtain this information, plot the results and determine the conditions which will give you maximum tool life commensurate with your production requirements.

## Equipment

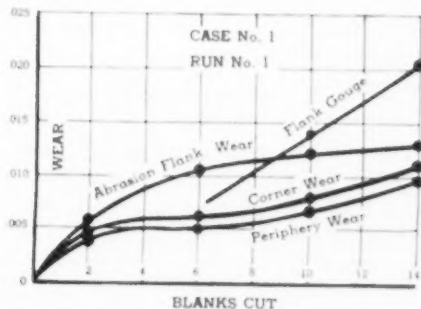
As shown in Fig. 1, the equipment used in these tests consisted of a micrometer stand, a microscope, a support for the microscope, and a support for the hob. The microscope is equipped with paired 10 X eyepieces, one having a micrometer disc calibrated to 0.001 inch, and the other having crossed hairlines. It has 2.0 X objectives. The support for the hob is a flat base for use when meas-



Fig. 1—Illustration showing setup of equipment used in the hob tooth wear measurement method.

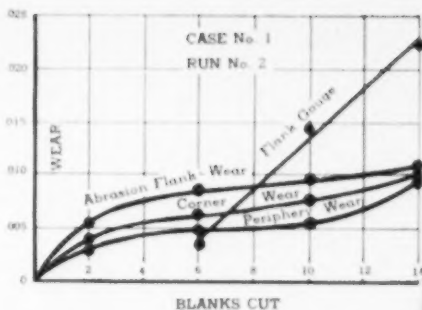
uring wear on the periphery and the corner. The support for measuring flank wear has an angular base, the angle of which is equal to the pressure angle of the hob being measured.

To read the magnitude of tooth wear, the front micrometer is moved so that the point of wear on the image lines up with the horizontal hairline. The micrometer reading is then recorded. The image is moved by the micrometer adjustment so that the face of the tooth coincides with the horizontal hairline. The micrometer reading is recorded, and the difference in the micrometer readings indicates the amount of wear.



#### Method of Testing

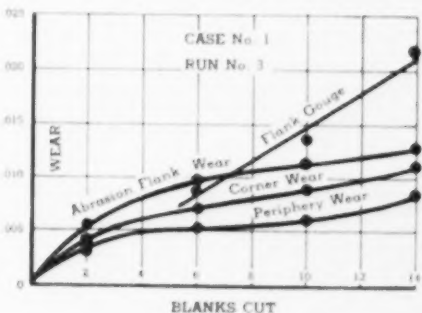
Five separate cases are presented to illustrate types of wear which are found on hobs. The first three cases are concerned with the hobbing of steel blanks using high speed steel hobs. A carbide hob used in the cutting of a cast iron blank was used for Case No. 4. The fifth case deals with the hobbing of a steel spline shaft with a carbide-tipped hob. Since no attempt was made to determine the type and amount of wear that might be expected under a certain set of conditions, these five cases were assumed to be sufficient to test the method of measurement and comparison.



Wear measurements were made at regular intervals during the test runs. A dial indicator was used to determine the amount of error introduced in the relocation of the hob after measurement. This amount was found to be less than 0.0003 inch and was therefore ignored. Ordinarily the hob must be sharpened until the worn area on all teeth is removed. Therefore, only the maximum of values of wear on the teeth which were dulled the most were recorded. Wear was measured only as the distance back of the cutting face, not as the distance from the side of the tooth toward the center. Special emphasis was given to the distribution of wear on the periphery, corners and flanks of hob teeth.

#### Terminology

In general, wear is caused by the continued use of a tool's cutting edges





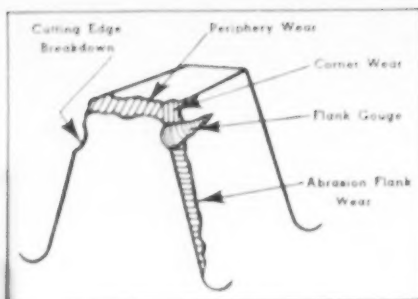


Fig. 2—Drawing showing locations of wear areas encountered during tests.

during a machining operation. There are any number of types of wear and varying degrees of each type; consequently, we must define the types of wear to which we will refer. Since we encountered only five general types during these tests, we will limit our definitions to these five. Figure 2 shows these types.

**Abrasion Wear:** A uniform dulling of a cutting edge similar to that which would be produced by filing the surface perpendicular to the cutting face and adjacent to the cutting edge.

**Flank Gouge:** The formation of a groove or cavity on the side of the tooth. This is usually just below the corner, as shown.

**Cutting Edge Breakdown:** A crumb-

ling or cratering away of the original contour of a cutting edge.

**Periphery Wear:** The wear formed on the peripheral surface of a hob adjacent to the cutting edge. This may be abrasion or breakdown type of wear.

**Corner Wear:** The wear, abrasion or breakdown produced on the corners of hob teeth. Most hobs have a chamfer or radius at the corner. For purposes of this discussion, we will consider the top half of the chamfer or radius to be the corner and the bottom half to belong to the flank.

Tables I and II provide the pertinent data for each of the five test cases which we are examining.

#### Test Cases

##### Case No. 1—HSS Hob and Steel Blanks

To initiate this investigation, a progressive type of hob life is presented. Hob wear was measured as the test progressed after the hobbing of 2, 6, 10 and 14 blanks. Three identical test runs were made under standard conditions.

The wear data are presented in the accompanying graphs. Very little variation was observed between the three test runs. The possibility of repeating

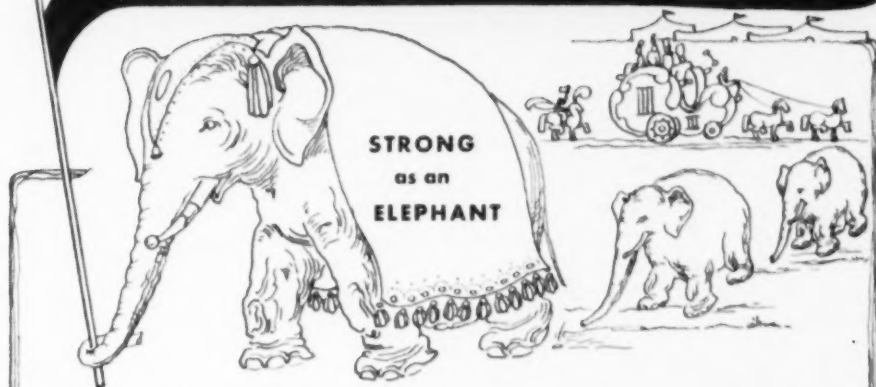
TABLE I—Hob and Blank Data

Test Case	Hob	Hob O.D.	Hob D.P.	No. Gashes	Corner Radius	P.A.	Thd. Angle	Rake	Blank	Blank O.D. (in.)	Face Width (in.)	Teeth	BHN	Helix Angle
1	HSS	2.75	10	11	.014"	14½°	2°16'	0	1315	5.10	2	49	137	0
2	HSS	1.88	18	10	.006" corner break	4½°	1°49'	0	1315	2.75	1	48	137	0
3	HSS	3.00	14	16	.018"	14½°	1°27'	0	1315 60%	5.46	2	74	137	0
4	Carbide K-6	2.00	14	10	.010"	14½°	2°14'	0	C.I.	1.24	.69	13	250	33° RH
5	Carbide 3S13	3.50	9.6	14	.000"	30°	1°45'	-15°	1330	1.28	2.56	12	311	0

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TABLE II — Cutting Conditions

Test Case	Machine Used	Hob RPM	Feed IPR	Type Cutting	Coolant Used	Machine Load	No. of Test Runs	Blanks Cut Run
1	16 16	140	.045	Conv.	A*	2 blanks	3	14
2	6 10	425	.045	Climb	A*	1 blank	1	25
3	16 16	204	.045	Climb	A*	2 blanks	2	30
4	6 10	1100	.045	Climb	Dry	1 blank	2	120
5	8 10	505 to 705	.040	Climb	Dry	1 blank	* 4	3

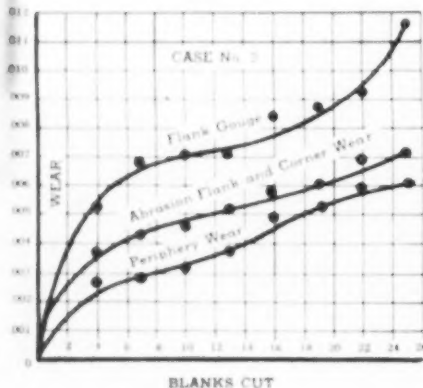
A\* — Coolant mixture — 90% Paraffin base oil and 10% sulphur base oil.

this type of test is illustrated by the curves.

The distribution of hob wear is clearly shown. The first wear observed on the flanks was an abrasion wear extending along the entire flank cutting edge with little edge breakdown. As the test proceeded, a gouge and flank edge breakdown formed on the tooth side. This was localized on one portion of the flank near the corner. This gouge increased in magnitude until it surpassed the flank abrasion wear. The periphery and corners of the hob teeth wore evenly with little breakdown. The wear on the corners and periphery was of the abrasion type.

#### Case No. 2—HSS Hob and Steel Blanks

This was a progressive type wear



test with hob measurements made after every three blanks. Hob wear was unevenly distributed on the cutting edges of the hob teeth. The abra-

TABLE III  
Run No. 1

Gear No.	Involute Error	Hob Flank Gouge Measurement
1	.0008"	.001"
10	.0008"	.014"
17	.0008"	.024"
26	.0010"	.034"
30	.0011"	.036"
Run No. 2		
6	.0007"	.024"
30	.0012"	.031"

sion flank wear and corner wear were approximately equal and are represented by one line on the curve sheet. A flank gouge was formed as in Case No. 1. Edge breakdown was present on the flank cutting edge. Periphery and corner wear was of the abrasion type with no breakdown.

#### Case No. 3—HSS Hob and Steel Blanks

This test was undertaken to determine the effect of flank wear upon gear involute. Two test runs were made. The first run consisted of hobbing 30 gears and measuring hob wear and involute accuracy at regular intervals.

The first run was completed when

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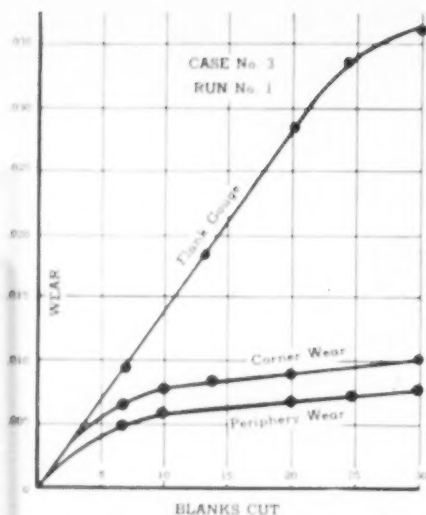
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0.036 inch flank gouge wear was observed. The hob was then sharpened back 0.016 inch leaving 0.020 inch initial flank gouge wear on the hob for the next test run. The periphery and corner wear was sharpened off completely since their measurements after Run No. 1 were less than 0.016 inch.

A tabulation of involute errors and hob wear is shown in Table III. It may be seen that hob wear of 0.036 inch only increased the involute error from 0.0008 inch to 0.0011 inch.

The generation of the involute form by hobbing is dependent upon several hob teeth. The clean-up teeth adjacent to the maximum wear teeth assist in the final generation of the involute form. For this reason it is difficult to determine a relation between involute error and hob wear.

It is interesting to note the slope of the flank gouge curve for Run No. 2. Although 0.020 inch initial flank wear was present on the hob, only 0.031 inch total flank wear was produced by the hobbing of 30 blanks. This wear is less

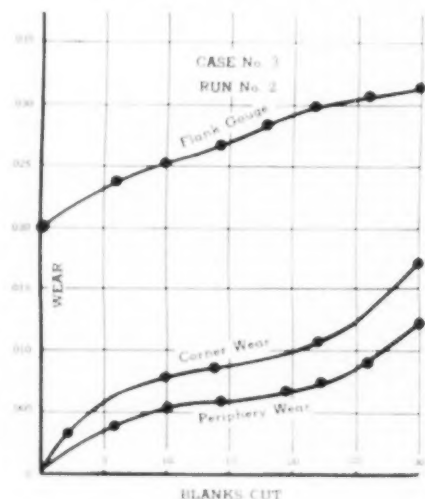
than that obtained by hobbing 30 blanks with a hob which was sharpened clean. This would indicate that in some cases hob life may be increased by not sharpening off the entire worn area.

The abrasion flank wear was approximately equal to corner wear on this test. Periphery and corner wear was of the abrasion type.

#### Case No. 4—Carbide Hob and Cast Iron Blanks

A carbide hob was used to machine cast iron distributor gears for this test. Two test runs were made under identical conditions. Hob wear was measured at 20-blank intervals.

It was on this test that a different type of flank wear was observed. The abrasion periphery and corner wear remained small during the test. A highly polished area on the flanks of the teeth was observed after the hobbing of 80 blanks. This area was located where the gouge had been formed on HSS hobs. To determine the nature of this polished area, the hob form was checked by projection after



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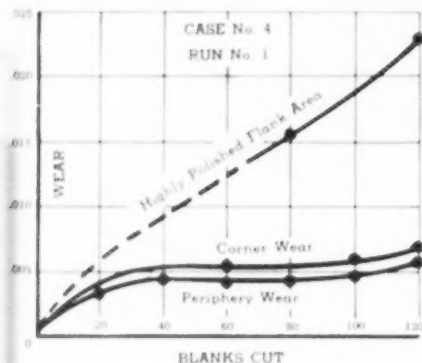
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Run No. 1. Some roughness was observed on the cutting edges but no general cutting edge breakdown was observed on the flank. To continue this



investigation, 0.004 inch was sharpened off the hob teeth. This left 0.019 inch of the highly polished area on the flanks. The hob was then checked by projection and found to be within the inspection limits. The cutting edges were straight and sharp.

To obtain further information the test was repeated. The periphery and corner wear was somewhat larger on this test. The same type of flank wear was formed. Some polished areas were observed on the flanks approximately  $\frac{1}{16}$  inch back from the cutting edge, not adjacent to the other wear. The cutting conditions, chip reactions, and carbide in use were probably responsible for this polished area on the tooth side.

The type of flank wear discussed above is not to be considered the general case when carbide hobs are used. Its presence was observed on only this one test. The abrasive action of the cast iron may have been the cause. It is possible that non-metallic abrasive materials may produce similar flank wear on carbides. If so, greater hob

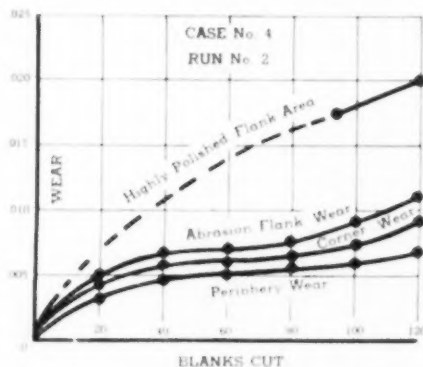
life may be possible by sharpening off the periphery, corner and flank abrasion wear and allowing any highly polished areas to remain on the flanks.

#### Case No. 5—Carbide Spline Hob and Steel Blanks

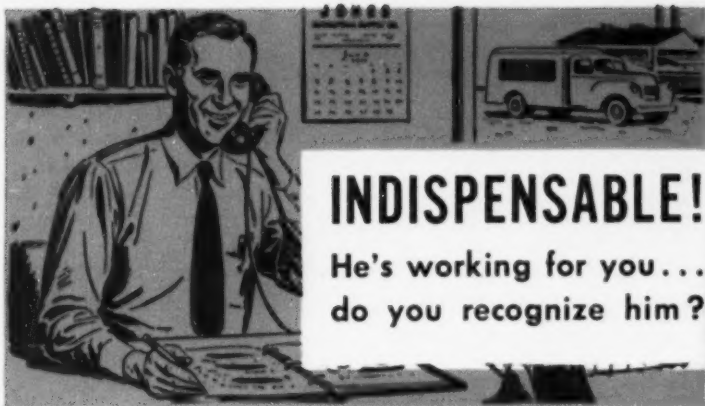
A different type of hob wear test will now be discussed. Instead of making progressive wear measurements, a constant number of blanks were cut under different conditions and measurements made after each run. Speed was the variable.

Corner breakdown was most serious on this test. Its magnitude far exceeded flank wear which was largest on Cases No. 1 through No. 4. It may be noted from the curve sheet that corner breakdown was reduced as hob speed was increased. Flank and periphery wear remained practically constant throughout the speed range tested. Breakdown was observed on the periphery and flank cutting edges.

This test is included to illustrate that flank wear is not always the most serious. It can also be seen that the



distribution of wear is affected by the cutting conditions. Corner wear was reduced from 0.018 to 0.008 inch by changing only hob speed.



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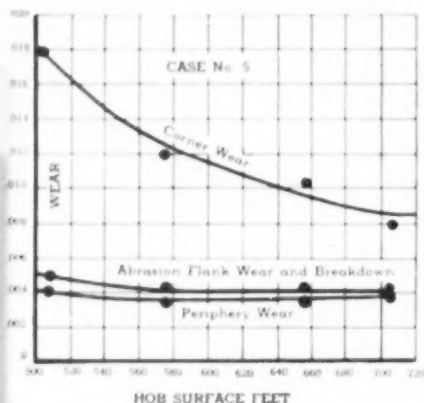


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### Conclusions

Let us emphasize again that no general conclusions concerning the pattern of hob wear are to be inferred



from these tests. Only the method of testing and the interpretation of re-

sults are under discussion. Each of your jobs would have to be thoroughly tested before accurate hob wear results could be obtained. However, hob life can probably be increased by a careful testing of each production job.

For all laboratory tests, it seems advisable to measure hob wear on the periphery, corners and flanks of the hob teeth. Wear curves similar to those presented here facilitate interpretation of test data and may be used as a basis of comparison between test runs. Progressive hob life tests similar to Cases No. 1 through No. 4 may be used when a complete study of hob wear is desired.

If information on the effect of feed, speed, rake and other cutting conditions is desired, a test and curves similar to those of Case No. 5 may be used. Information on the amount of radius

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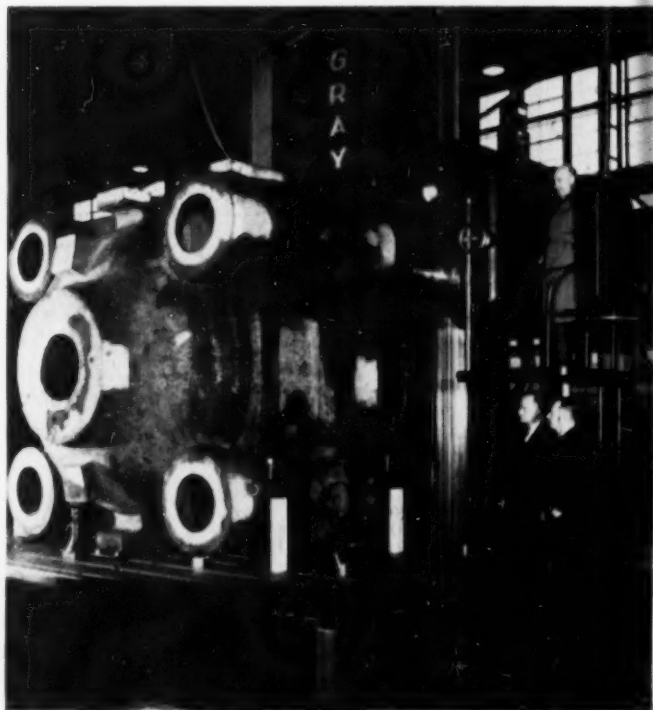
or corner break which will give maximum tool life can also be obtained in this manner. The hob in Case No. 4 had a 0.010 inch radius while the one in Case No. 5 had a zero radius. It will be noted that the maximum wear shifted from the flanks in Case No. 4 to the corners in Case No. 5.

Hob wear was unevenly distributed around the cutting edges of the hob teeth in all five cases. It may be possible through a thorough study of hob wear to obtain cutting conditions which will produce uniform distribution of wear on the hob tooth.

*(Illustrations and information furnished through courtesy of Barber-Colman Company.)*

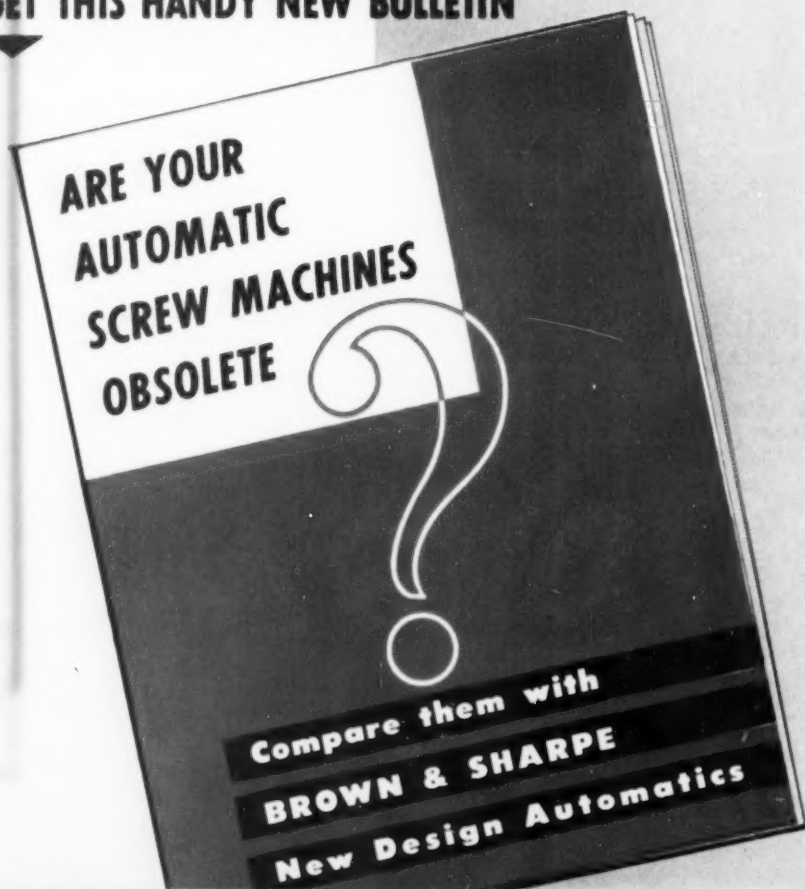
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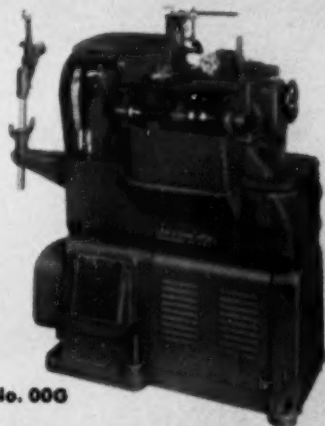
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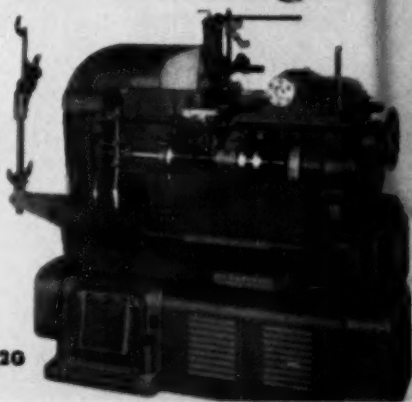
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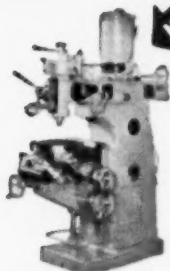
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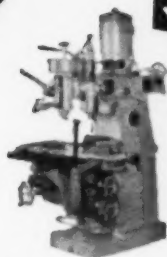


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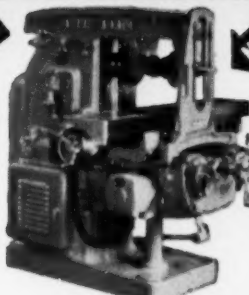
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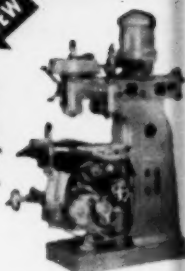
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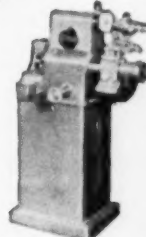
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C. W. Hinman

# An Analysis of Forming Die Designs

The author discusses the design and operation of dies for forming tubular steel parts.

By C. W. HINMAN  
Designing Engineer

DIES which are used for cold bending and forming sheet metal parts usually require a considerable amount of experimentation prior to use because of the tendency of the work to "spring-back" after being bent or formed. This spring-back is caused by the residual resiliency in the work materials. The amount of spring-back varies with the type of work material,

its thickness, and severity of the operation.

For example, when bending an angle in dead-soft steel, spring-back may be only  $\frac{1}{2}$  to 1 deg.; for hard rolled steel, 4 to 5 deg., but for extra hard brass or for phosphor-bronze sheet, spring-back may reach 12 to 15 deg. These difficulties are compensated for by bending the work to an angle **less** than that wanted, so that the work will open, after removal from the die, to approximately the right shape. The determination of the die bend is therefore a problem of experimentation by the diemaker.

Heating the work material prior to bending and forming helps to reduce the amount of spring-back but, in general, heating should be avoided if possible. Hot bending is ordinarily a slow method, involving the use of a furnace and the possibility of having cold blanks, and, at its best, is more expensive than working the metal cold. However, hot bending must be resorted to

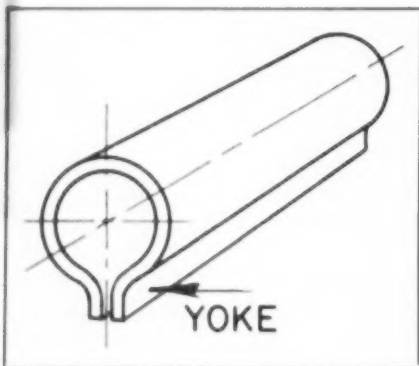


Fig. 1—Sketch of tubular steel part with yoke formed in one press stroke.

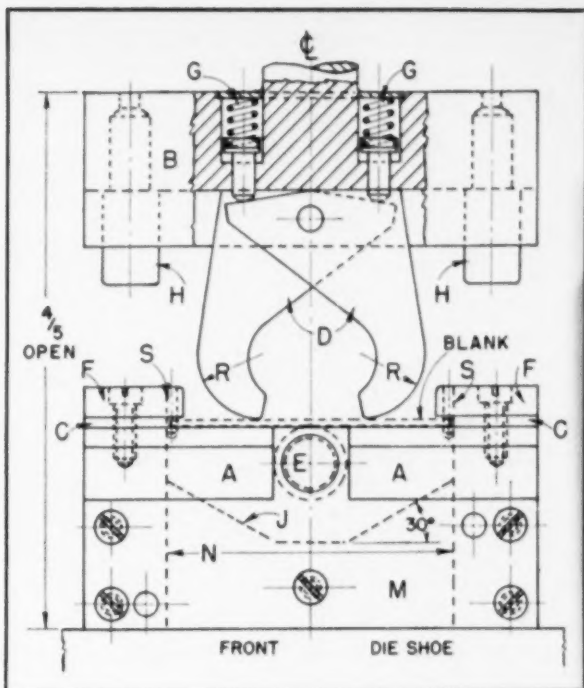
Fig. 2 — Drawing showing position of punches and work in die prior to commencement of forming operation.

when working metals such as spring steels and other hard rolled metals.

### Forming a Steel Tube and Yoke

The round yoke-shaped tube shown in Fig. 1 is formed from a flat steel blank in one press stroke. The work material is No. 16 U. S. gauge (0.0625-inch) mild steel. The design and operation of the forming die are sketched in Figs. 2, 3, 4, and 5.

Referring to Figs. 2 and 3, previously cut blanks are inserted at the front of the die under plates **F** and between guides **C**, as shown by width **N** in the die. The operator pushes the blanks forward, one behind the other, on the top surfaces of the tables **A**, which are welded to the front plate **M**. Feeding is effected through a T-chute, as shown in Fig. 5. Plate **M** is screwed and doweled to the front of the die and supports forming stud **E**, which is riveted in the plate. At the rear of the die is a latch, **L**, which supports the stud at the right rear. This latch is so positioned that, when inserting another blank in the chute, the blank pushes the finished work into contact with the latch and opens it for ejecting the formed work. The latch is then returned by tension spring **K** for sup-



porting the stud when forming the next blank. Stud **E** and die **J** are of tool steel, hardened and ground for long wear.

When feeding the first blank through the die, it is halted in position for forming by contacting a pair of French stops, **S**. These stops are so arranged that when the punches, in descent, bend down the extended ends of the blank on forming stud **E**, the arms clear the stop pins and the work is released. In Figs. 3 and 4, plate **M** is removed to show the forming operation more clearly and to avoid any confusion of dotted lines in these views. These two figures show the five tapped holes and two dowel pin holes that are used to fasten plate **M** to the die.

The two forming punches **D**, which

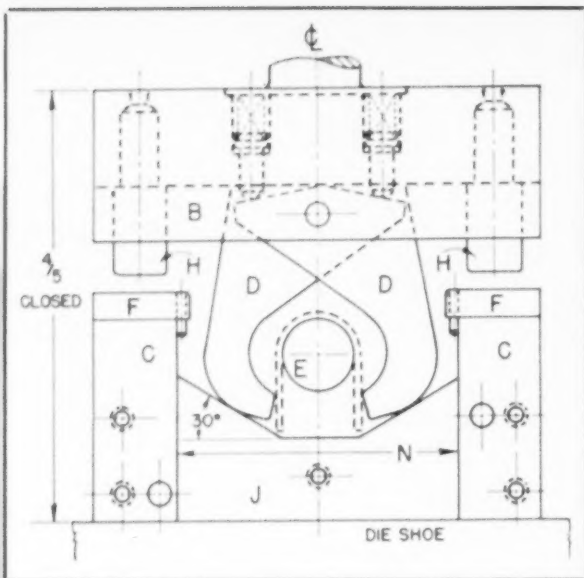


Fig. 3—Drawing showing U-shape which part assumes upon descent of punches into forming die.

pletion of the down-stroke, the heels stop positively against the upper surface of the slot in punch holder **B**, as shown in Fig. 4.

The forming punches, in descent, contact the blanks when the press ram has descended one-fifth of its stroke, as shown in Fig. 2. Upon continuation of their descent, the punches form each side of the blank equally down over

are also made of hardened and ground tool steel, consist of a pair of hinged tongs that swing on a fulcrum pin inserted across a slot in punch holder **B**. The slot confines the forming tongs with about 0.005-inch lateral clearance. Normally, the forming punches are held open by the action of several spring loaded plungers, **G**, as shown in Fig. 2. When closed, the 12-deg. angular heels on the punches operate on a jack-knife principle. At the com-

stud **E** and are converged toward one another by contacting two 30-deg. angular ramps on the die block **J**. Continuing to descend, the punches form the work U-shaped, as shown in Fig. 3, and, at the conclusion of the down-stroke, the punches converge and close the metal firmly around the stud, forming the yoke underneath, as shown in Fig. 4.

Two bumper pins, **H**, prevent the punches from being closed too severely

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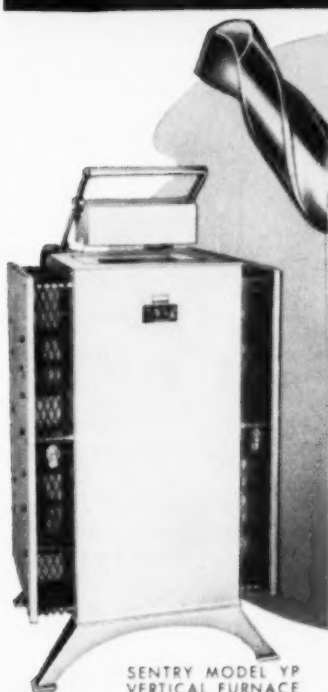
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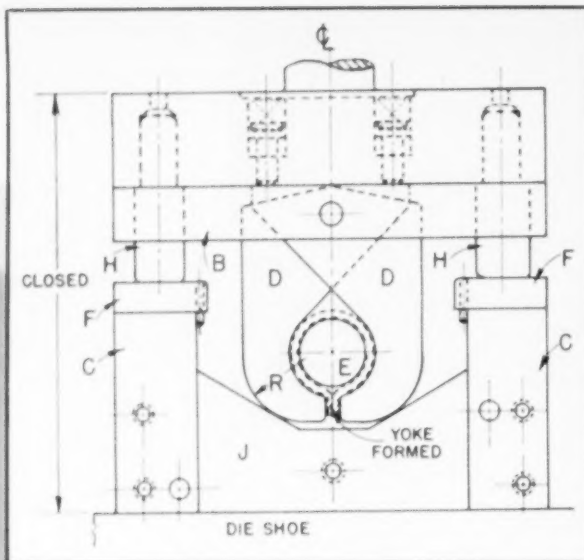


Fig. 4—View of forming die showing manner in which punches converge to close part around stud, forming yoke underneath.

type, it is always best that the tool engineer lay out the last forming operation first, as shown in Fig. 4. The reason for this is that all of the preceding operations can then be traced from the final sketch, and at the same time, each operating position can be designed to suit the various stages of the ram descent. When three or four consecutive positions

of the punches and die have been sketched, the designer has the job well in mind for detailing all of the die parts correctly.

on the downstroke and also aid in setting up the die in the press. Another advantage of the bumper pins is that they determine the exact closed height of the die without experimenting and without injuring the punches if closed to a height which is less than the prescribed die space. The bumper pins also prevent injury of delicate parts of the die when in storage. Specifying bumper pins in a die has avoided many a costly accident.

When designing forming dies of this

type, it is always best that the tool engineer lay out the last forming operation first, as shown in Fig. 4. The reason for this is that all of the preceding operations can then be traced from the final sketch, and at the same time, each operating position can be designed to suit the various stages of the ram descent. When three or four consecutive positions

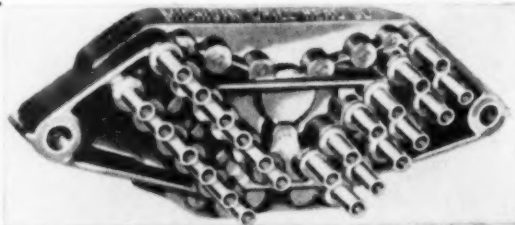
#### Forming a Plain Tube without a Yoke

In order to form a plain tube without a yoke using this type of die, the only die changes necessary are to alter the width of channel N and to design the forming punch noses of sufficient length to meet under stud E at the maximum downstroke. However, be-

**Pictured: a 24-Spindle Heavy-Duty Drill Head.**

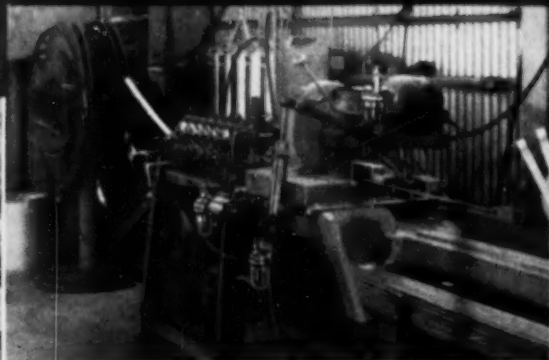
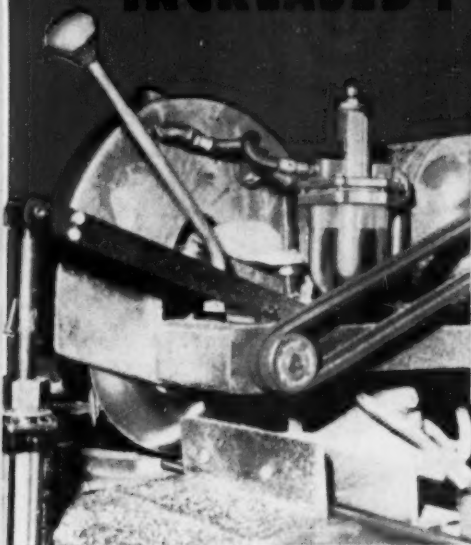
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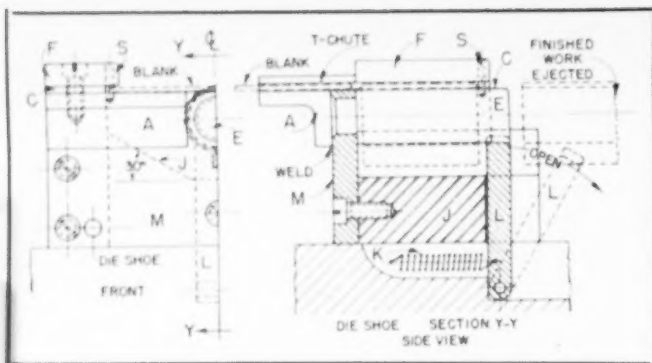


Fig. 5—Sketch showing manner in which blank is fed through T-chute into forming die.

cause of the inevitable spring-back in the work, the formed tube will open slightly at its seam. Nevertheless, this is an advantage in a die of this design since it causes the work to be loosened on the forming stud for pushing off easily.

To avoid spring-back, the diemaker

the formed tube so that the completed work will spring open approximately to size after it is ejected from the die. The diameter of stud E is therefore an experimental determination by the diemaker. Tubular work that opens slightly at its seam can be closed together by pushing the tube

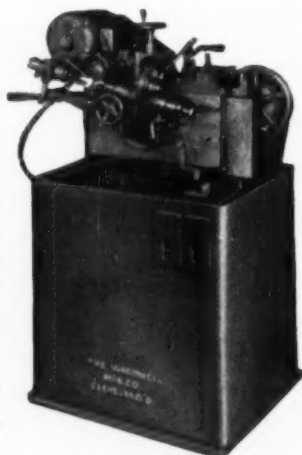
does some experimental work; he makes stud E of slightly smaller diameter than the specified inside diameter of

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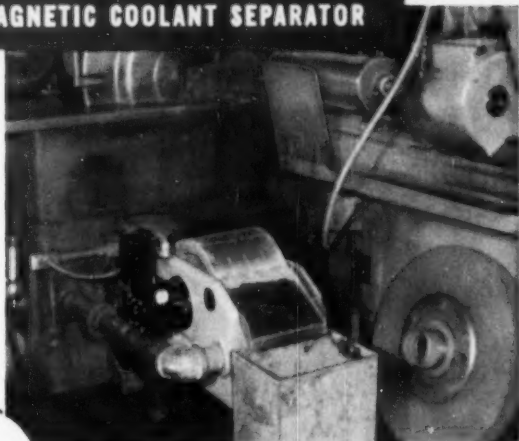
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through a second-operation burnishing die. This operation "irons" the skin of the metal and also removes twists in the tube if any are present.

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end being 0.005 inch in diameter less than that wanted in the tube, and the body diameter is 0.005 inch less than the outside burnished diameter of the tube. The punch is fastened in the shaper ram and is permitted to "float" a trifle. The tubes are fed through a vertical chute fastened in front of the die bushing and extending its full length above it. This arrangement is simple and economical for burnishing

and sizing tubular work and provides for fast operation. No die set is required for this setup.

Returning to Fig. 5, the French stop pins S can be located at different points for producing shorter lengths of yoke-shaped tubes. There is no set limit as to the lengths of work that may be formed by increasing the length of stud E, although a reasonable maximum length would be approximately eight times the diameter of the forming stud, depending upon the thickness and toughness of the work material and the severity of the operation.



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The design of this type of forming die also enables it to be incorporated as the last station in a progressive die. If pierced holes are necessary in the flanges of the yoke piece, a die can be designed that will handle such work completely in one pass through a progressive die. In the first station, the holes can be pierced and the blank cut to length, leaving a small connecting neck of metal at the center for advancing the work strip ahead. The second station is idle to avoid forming too close to the cuts; however, in the third station, the work is formed as shown in Figs. 4 and 5. The work is ejected by withdrawing stud E parallel with the die through the use of an angular side cam punch situated at the end of the die. The neck of metal between blanks can be severed from the work strip simultaneous with forming in the last station.



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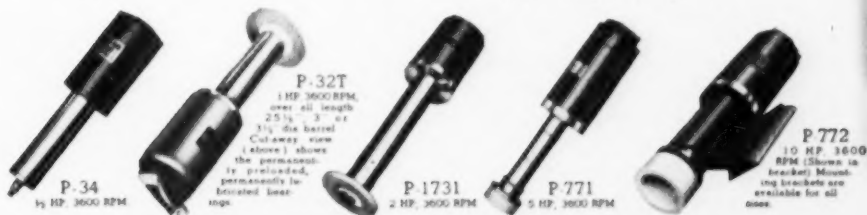
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Karl F. Kirchhofer

# Sales Hints for the Smaller Shop

**Benefits to be derived from publication of an external type house organ by the smaller shop.**

By KARL F. KIRCHHOFFER

THE importance of the house organ in the sales promotion program of many large organizations has been well established. Smaller concerns engaged in metal-working, as well as a variety of other operations, also publish monthly or bi-monthly house organs that are read with interest and have a circulation from a few hundred to many thousand copies.

There are two general types of house organs, the internal publication which is published by a company and distributed to employees as a morale builder and general disseminator of news of company and employee activities, and the external organ which is sent to customers and prospects and endeavors to enhance the position of an organization in the trade, to serve as an educational and institutional medium, and, of course, to help sell products and services. In this article we are concerned with the external type house organ and especially with one that can be used by the smaller metal-working plant.

A house organ is issued periodically and ranges in size from a one-page

newsletter to an elaborate magazine. The writer served for some years as editor of a house organ published by a nationally known machine tool and precision instrument company. The publication was issued every other month and was a four-page photo-off-set folder entitled "Precise Production" that was circulated to a list of 20,000 metal-working plants. This list, incidentally, was obtained through a trade publication serving machine shops, and was recommended in a recent column of "Sales Hints for the Smaller Shops" for direct mailing purposes.

The publication was designed primarily to introduce newly-developed precision instruments and to explain how metal-working plants could reduce rejections, speed up production, and save money by employing these tools. It was educational and instructive in tone, written from the editorial slant, somewhat in the accepted trade journal style, with no blatant and conscious sales talk included. Photographs of instruments in use and data on actual installations and case his-

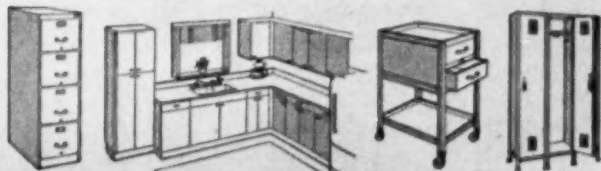
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tories were included so that the reader could judge for himself how the tools would fit into his inspection and production program. The publication was quite successful since it produced many inquiries, some of which later were transformed into actual orders.

House organs are and have been very effective not only in creating new business, but in performing a steady institutional job to keep old customers satisfied. Too often, in his zeal to solicit new accounts, the smaller shop owner may be neglecting unconsciously his old and faithful customers, taking them too much for granted. The house organ serves as a friendly reminder and is a constant good-will breeder which lets old customers know about developments in your business that may prove to be profitable to them. For the smaller shop, with perhaps a couple of hundred customers who use its goods and services from time to time throughout the year, the house organ need not be an elaborate printed piece. In fact, it might be a simple one-page multigraphed release announcing the acquisition of a new type machine tool which will enable the user to handle more intricate and exacting work.

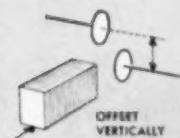
If you, for example, are a specialist in a certain field, such as industrial diamonds, your house organ might well be a single sheet or a four-page folder which continually shows how industrial diamonds can be used with the best results. If you operate an automatic screw machine shop, you may wish to take photographs of intricate jobs and write up a description of the work, tolerances, and how your shop turned out the work on an economical basis.

Make your house organ interesting.

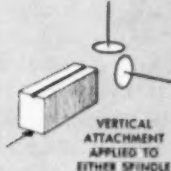
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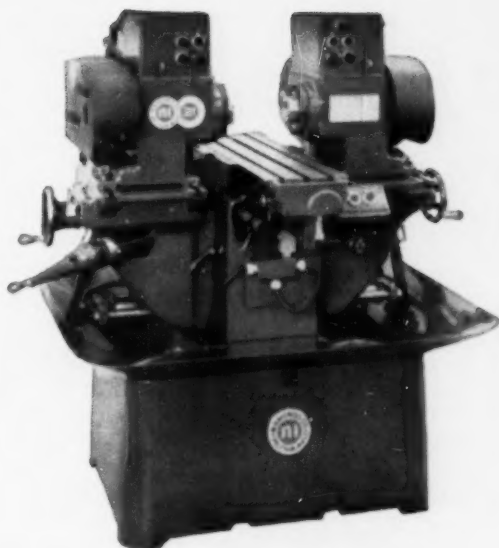
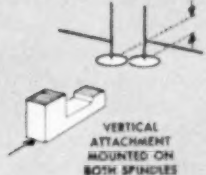
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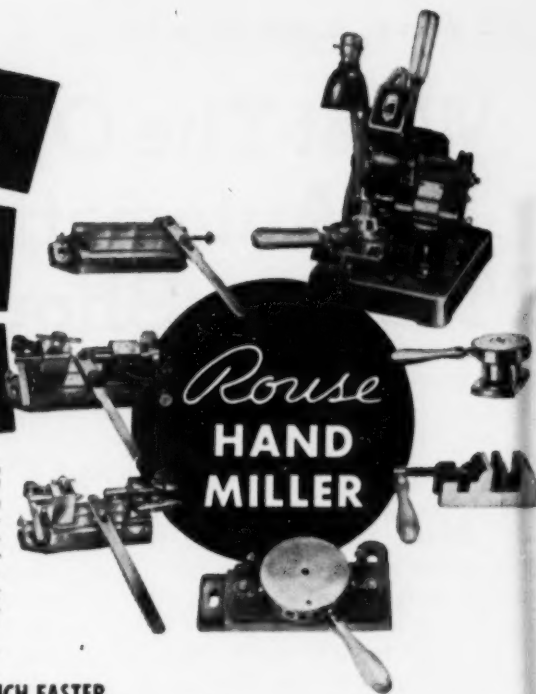
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# What The Operator of An Automatic Screw Machine Should Know About Carbides

By J. S. GILLESPIE\*

**T**HE use of carbide tools on screw machines has now reached the point where such tooling for the machining of steel parts as well as other materials is accepted as quite a matter of course in many plants. This applies not only to the newer screw machines designed specifically for the use

of carbides but also to automatics and semi-automatics in use for some time.

Carbide turning, boring, facing, and form tools, of course, have been in use for a good many years. Carbide cut-off tools were added to the list a few years ago. More recently, it has become possible to obtain carbide drills and chasers for special jobs so that there are today few operations performed on automatic screw machines which can not or are not being regularly tooled with carbides for both greater production and better finish.

So far, it is true, there has been no standardization of carbide tools for screw machine work. Each job in the past had to be worked out individually for complete use of carbides. This situation still holds true to some extent and the specific tool design data given in this article will not necessarily apply to every job. Nevertheless, it will give a general idea of how to start tooling up a steel job with carbides on automatic screw machines.

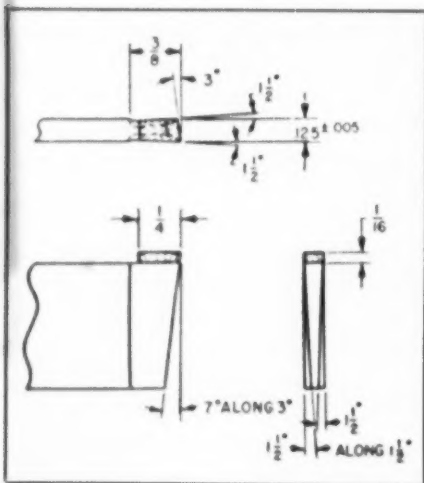


Fig. 1—Carbide cut-off tool which gave best results for cutting off SAE 4620 tubing.

\* Manager of Tool & Wear Parts Sales Engineering, Carbology Company, Inc., Detroit, Michigan.

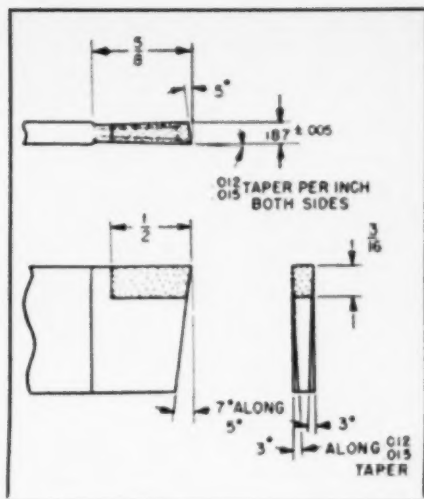


Fig. 2—This cut-off tool also worked well on SAE 4620 tubing.

### The Machine

Horsepower required on any machine tool is dependent, of course, on the rate of metal removal. Since carbide tools remove more metal per minute, it is customary to use a slightly larger and heavier machine than for the same job with steel tools. This condition helps provide the greater rigidity desirable for the higher operating speeds with carbides, permits the use of larger tool holders for rigidity, and provides more room to handle the increased volume of chips produced. Use of larger machines, however, is not necessarily essential. Sometimes an increase in motor horsepower is all that is required—particularly when the automatic is in good condition.

Rigidity of the machine—increasingly important as speeds are increased—will be improved through the use of accurate, smoothly-functioning cross slides, spindles, spindle bearings, tool turrets, tool holders, feed shells,

and chucks. Use of additional stock rest bushings and cutting bar stock to shorter lengths than usual will also help eliminate vibration.

Soluble oil coolants generally prove most desirable for carbide tooling, particularly where seals and wipers are in good condition and splash guards are used. Best results are obtained when the fluid is directed at the point where cutting takes place, at the highest velocity possible without undue splashing. Usually, from 3 to 5 gallons per minute for each single point tool is advisable.

### Cutting Tools

**Form Tools**—Flat, dovetail, and circular carbide form tools may all be used. Dovetail and circular form tools give greater tool life, are easy to maintain, and easy to sharpen. Though somewhat higher priced, tool cost per piece is lower where runs are sufficiently large. The circular form tool is not quite as rigid as the dovetail since

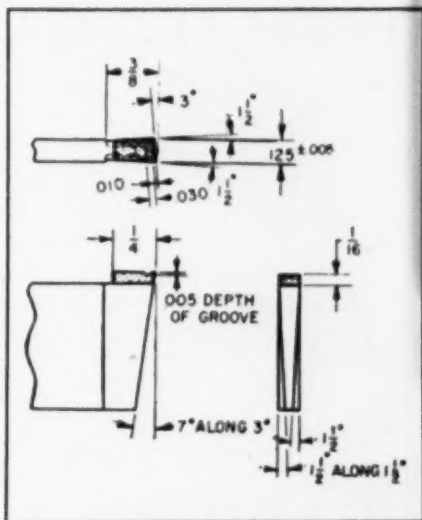


Fig. 3—Carbide cut-off tool with standard groove type chip breaker.

**50%  
INCREASE  
PER  
MAN  
HOUR**



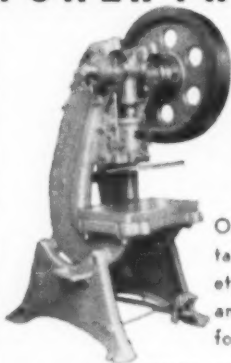
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it usually overhangs the side of conventional holding blocks.

Form tools up to 2 inches in width are being used successfully. Wider tools work well where forming slides are strong and rigid enough to prevent chatter. Best results in cutting wide forms are obtained if the tool is broken up into several simple compon-

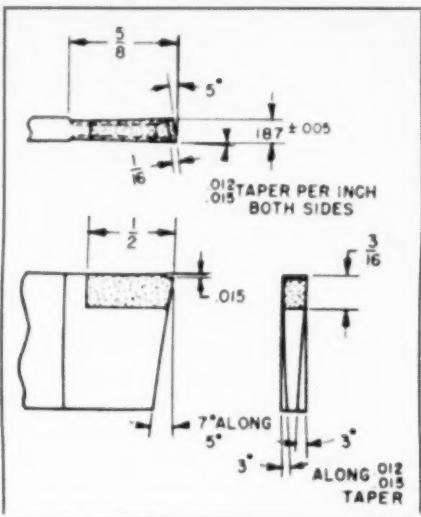


Fig. 4—Carbide cut-off tool with standard step type chip breaker.

ents. This simplifies tool grinding and decreases the peak power requirement for forming. The simpler form tools also can be obtained by simply regrinding standard catalog tools, reducing tool cost.

Usual objections to the breaking up of form tools do not apply to carbides since life of carbide tools is longer; downtime less; and possible increases in setup complication can be offset by use of calibrated toolposts and tool slides, cartridge type tool holders, and setting gages.



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*Material:* Coiled 10-9/16 x 16 ga. C.R. steel is hand fed to die from automatic coil cradle. *Tolerances* of  $\pm .005$  are held in some cases, and slightly higher on other operations. *Die size:* 23-3/4" x 18". *Press:* 160 ton Bliss.

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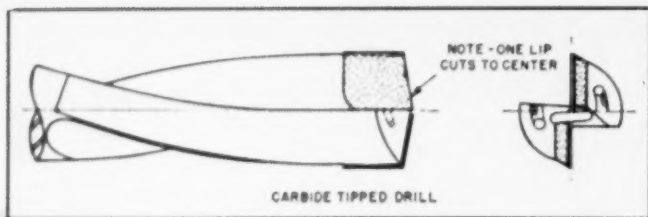


Fig. 5—Carbide tipped drill.

Satisfactory performance is usually obtained on low carbon steels with form tools having 0 deg. top rake, 3 deg. to 5 deg. front clearance, and 3 deg. side clearance on all shoulders.

Some failures with carbide form tools have been caused by using very thin tips on existing HSS tools in insufficiently rigid holders, instead of using regular carbide tools in sturdy holders, thus depriving the carbide of adequate support.

As mentioned, speeds for machining steel with carbides are about 3 times

of form, due to the horsepower required to remove metal. Heavier feeds can be used with narrower form tools. Shape of form also has a bearing on feed per revolution. A tool with a large radius will be more apt to wedge chips, putting greater pressure between the work and the tool, generating more heat, and possibly developing chatter. This condition would be aggravated where a tool has more than one large radius. In such a case, the form may be split up into several simple tools. A good rule of thumb is to

those normally used with HSS tools. Feed per revolution is limited by width

## No Buttons! No Levers!

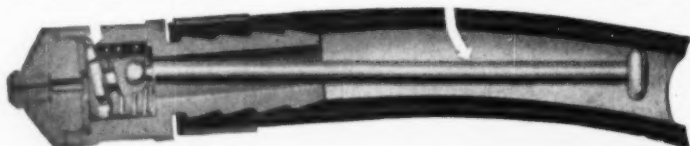
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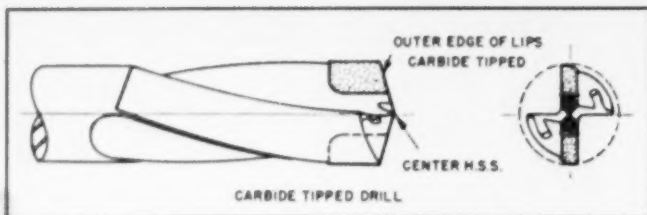


Fig. 6—Carbide tipped drill.

which can operate at a lighter feed.

A point to remember in cam design when

start with 0.003 in. feed per revolution for rough forming and 0.001 in. feed for finish forming.

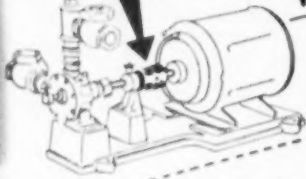
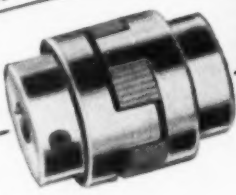
With forming, as much stock as practical should be removed during the roughing cut. As the diameter of the part decreases, it becomes weaker and may cause vibration or chatter at the high speeds and lighter feeds used for finish forming. A heavy feed on the rough form holds chatter and vibration to a minimum. Only a little stock is then left for the finish form tool

carbides are used is that dwell should be reduced in view of the higher cutting speeds. Use of the customary length of dwell results in the tool merely riding the work with resultant lapping and possible dulling of the cutting edge. In general, dwell should be held to a minimum in finish forming. In rough forming, it may well be eliminated altogether.

**Cut-Off Tools**—In cutting off steel tubing or work with a hole, good results are usually obtained by applying


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## NEW NO. 24 HYDRAULIC SETS PACE OF PART EVERY 1.2 MINUTES

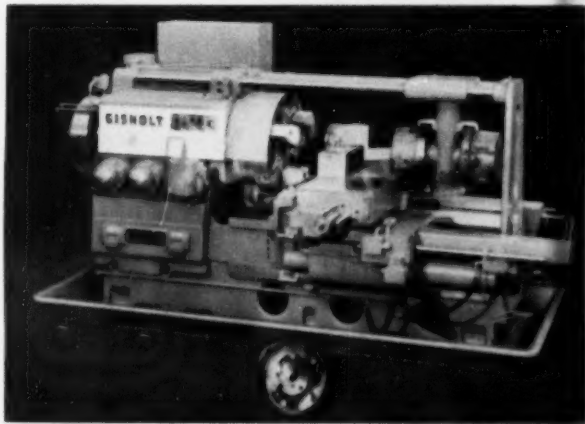
**GIVES BONUS OF  
8 PARTS PER HOUR  
OVER GUARANTEED TIME**

Though new, the No. 24 Hydraulic Automatic Lathe is already setting enviable records. For example, take this job—the machining of diesel cylinder heads. In demonstration tests, the Gisholt cut nearly 20% from the guaranteed time of 1.5 minutes per part. That's a bonus of 8 parts per hour!

For machining these cast-iron heads, the No. 24 Hydraulic is equipped with front and rear carriages and slides. Simple, standard tools rough and finish turn the 13 $\frac{3}{8}$ " diameter as well as both inner and outer faces. Even with the interrupted cut (see photo) on the inner face, the job is smooth and accurate.

### SPECIAL LOADING DEVICE SAVES MORE TIME

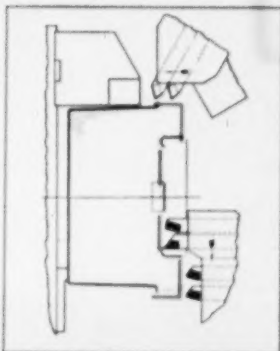
Even the loading of parts goes streamline in this operation. After a part is completed, the spindle is stopped and the unloading arbor is hydraulically moved toward the spindle. The air chuck jaws are released, and the arbor and lock carry the workpiece clear of the tools. The fixture is then hand-indexed and power traversed to bring the new workpiece up to the spindle. The new piece is then clamped in the chuck, and the



**Gisholt Hydraulic Automatic Lathe with special loading device.  
Part on floor shows interrupted cut.**

fixture is again moved away from the tools. After the machine is started, the operator removes the completed piece from the loading arbor and replaces it with a new part, ready to be machined. Only 0.2 minute time is required for loading and unloading—the balance of the arbor-loading time being taken while the machine is cutting chips.


Surfaces shown in red are machined in this operation. All cuts are divided and a full  $\frac{3}{8}$ -inch of stock is removed by each tool bit.



TO GET MORE OF YOUR MONEY'S

## TURRET LATHE SAVES 2 HOURS PER PART

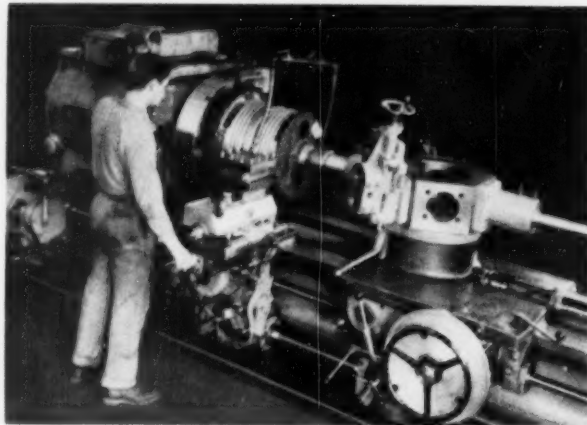
### ADDS BORING OPERATION IN SAME CHUCKING

 Saving time to the tune of 2 hours per part . . . that's exactly what a Gisholt 5L Saddle Type Turret Lathe did in producing these cable drums for power shovels.

The drums are grooved so one cable winds while the other unwinds—making a real problem. Each cable end runs through a cored slot in the drum and is made fast inside. Slots are at both ends of the drum, and each cable winds toward the center.

### SMART SET-UP

Here's the job set up: The cable drum is chucked on the inside with a Gisholt 4-jaw combination chuck and supported from the turret with a live center. The grooving tool on the square turret tool post is run into depth in the cored slot. Then the spindle is started and the cross slide carriage is given a special, very coarse feed. The operator



Drum grooving job is done 2 hours faster by this 5L Saddle Type Turret Lathe.

merely stops the spindle at the end of the groove.

### BRAKE STOPS ON DIME

The quick, positive action of the electric spindle brake literally stops the work on a dime—within even

less than a half-inch of the center of the locking or returning groove. The other groove is turned by simply reversing the carriage feed.

Result: two hours saved on every part—plus the additional operations of boring out the hub with the same chucking.

## 3/4-TON PART ON A RAM TYPE LATHE? THAT'S NEWS!

### SAVES MONEY—HERE'S HOW

Talk about a boy doing a man's job! Here's a Gisholt No. 5 Ram Type Lathe handling a part so big, it is loaded and unloaded by a traveling crane. Actually, the work weighs 1,480 lbs!

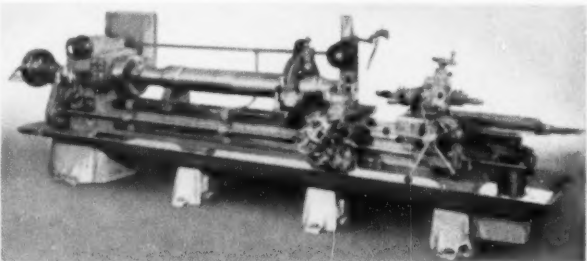
This manufacturer made a substantial saving in equipment costs by using this Ram Type Lathe for machining the ends of these large, heavy locomotive axles. Simple machining is done from both the turret and cross slide, with each end being machined in a single operation. Floor to floor time is 8.6 minutes per end.

### HAS REMOTE CONTROL

Except for the special length bed and extended controls and drives, it is a standard machine throughout. Because of the great length of the work, a second Speed Selector

wheel is installed, convenient to the work end. Linked mechanically to the regular hydraulic Speed Selector on the headstock, it permits the operator to select spindle speeds without leaving his working position, with all shifting done hydraulically.

The ability of this machine which normally handles 2 1/2" bar work, to do this job means considerable savings in the cost of the machine for this manufacturer. The great size and weight of the axle provide dramatic proof of the machine's strength, rigidity and power.



This No. 5 Ram Type Lathe does all machining on axle end in 8.6 minutes.

**OVERAGE MACHINE TOOLS MEAN**





WORTH OUT OF MAN-HOURS



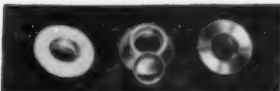
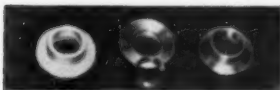
COST  
CUTTING  
IDEAS

## 4 OPERATIONS—2 FASTERMATICS—1 MAN

### MACHINES DOUBLE AS RACE PRESSES

Here's a smart move that's saving plenty. The parts being produced are drive pinion bearing sleeves, and this one operator tends the two IF Fastermatics which completely machine them. The manufacturer is the Warner Automotive Parts Company of Auburn, Indiana.

One Fastermatic does the first operation (see layout). The casting is held on the hub with a 2-jaw air chuck. The flange is turned and straddle-faced while the bore is roughed and finished. After machining, the spindle is stopped and a hardened tapered roller bearing race is loaded on a special turret fixture. Then, a touch of the hydraulic hand control traverses the turret forward, and the bearing race is pressed into the bore.



Rough castings of the pinion bearing sleeves, after machining and with races in place.



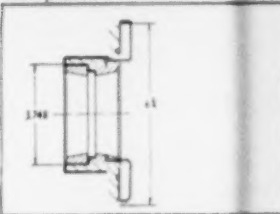
These 2 Fastermatics completely machine the drive pinion bearing sleeves and place bearing races.

### 2nd FASTERMATIC COMPLETES JOB

The job then moves to another IF Fastermatic for the final operation. Here, a spring loaded tapered center is used to center the workpiece on the hardened bearing race. A special air clamping fixture holds and locates against the flange, and the hub is then turned, faced, bored and counter-bored. Identical equipment is used to press the second bearing race into position.

The net of this Fastermatic team is a completed part every 3.63 minutes—with a further saving in handling time and equipment cost

through the machines' doubling as race presses.



Layout shows surfaces handled by first machine (in red) and those done by 2nd machine (in black).

## PRODUCTION OF BRAKE DISCS INCREASED 60%

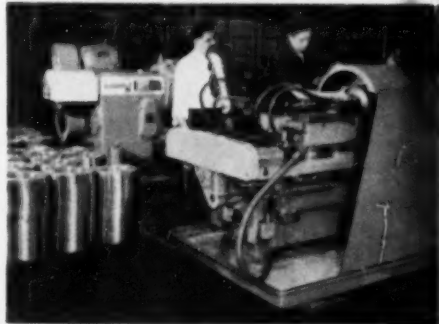
The scene here is in the Goodyear plant, Akron, Ohio, where airplane brakes are made. The operation is machining brake discs.

One man and two Simplimatic Automatic Lathes do the complete disc machining job — with lots ranging from 200 to 500 parts per run. Production rate on this size brake disc is 10 pieces per hour.

The job wasn't always handled this way. Formerly, work was done on hand-operated machines. A comparison between the two methods

reveals TWO important savings. The first is clear: automatic operation over hand operation. The second is a 60% increase in production by the Simplimatics doing the same job.

Add these up and you learn that the new Simplimatics will pay for themselves in less than 2 years.



Discs are machined in 2 operations, on 2 Simplimatics by 1 operator.

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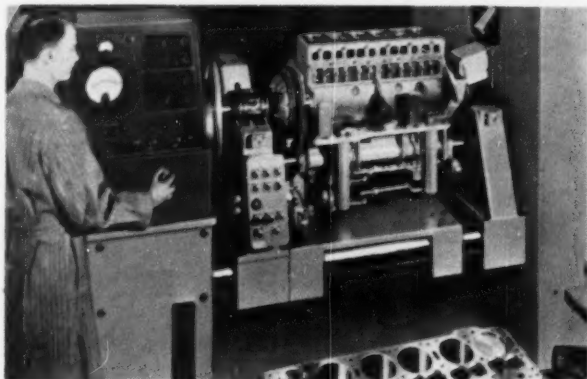


**COST  
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Engine assembly being checked for unbalance.

unbalance is determined in the two required correction planes. These readings are transmitted directly to the correction drill spindles which, after the crankshaft stops, are brought in to make the corrections on fan pulley and flywheel. Thus, any accumulation of unbalance is quickly and accurately

located and corrected — assuring owners of these cars an even greater measure of engine smoothness and performance.

**DYNETRIC  
BALANCERS**

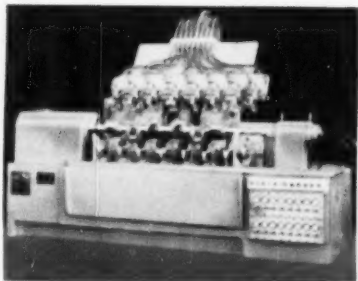


Manufactured under license  
by Gisholt Machine Company  
Madison 10, Wisconsin  
Model U-1, Type U Balancer  
Model U-2, Type U Balancer

## SUPERFINISH CUTS GRINDING COSTS HANDLES 8 BEARING SURFACES AT A TIME

Here's another example of how a switch to Superfinish brought immediate results. The grinding down of bearing surfaces of these 60" diesel crankshafts was a slow and costly job. A number of passes were needed to obtain the required surface finish of 5 micro inches. Now it's a cinch—grinding is cut to a single operation to get 30 micro inches. Then to the Superfinishing machine and in only 2.0 minutes all bearings are simultaneously Superfinished down to 5 micro inches of surface roughness—

saving time and costs. Faster production isn't the only benefit this manufacturer gets from Superfinish. He saved in capital investment also because this Model 70 Superfinisher handles all sizes of crankshafts—present and future designs. Each bearing has its own roughing and finishing stone holders which can quickly be adjusted laterally. Moreover, he is now making crank-



All 8 bearing surfaces of this 60-inch crankshaft are Superfinished at one time

shafts having better, longer-wearing bearing surfaces.

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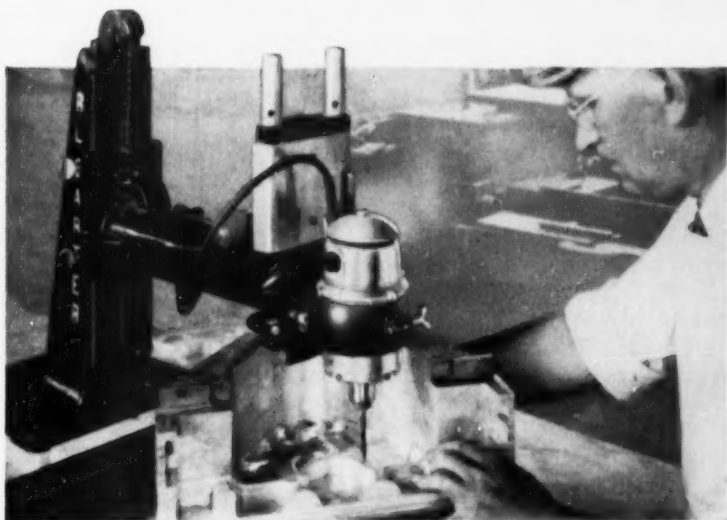
Literature on Gisholt Turret Lathes, Automatic Lathes, Superfinishers, Balancers or Special Machines is available upon request.

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No. 650

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Fig. 7—Solid carbide drill.

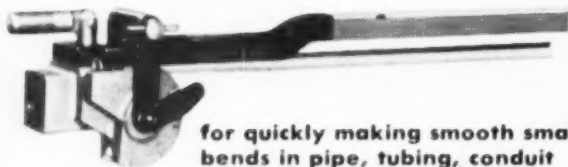
conventional techniques to carbide tools. When cutting off bar stock to dead center, good results are being obtained by splitting up the cut—starting with a carbide breakdown tool and, after workpiece diameter has been decreased, using HSS tools for the final cut-off to dead center. If more than one carbide breakdown tool is required, each tool following the first should be about 0.005 in. narrower.

The nature of the job determines cut-off tool angles. The tool shown in Fig. 1 gave best results for cutting off SAE 4620 tubing, but the tool in Fig. 2 also worked well on a similar job.

The tool shown in Fig. 1 was used at 446 SFPM; feed per revolution was 0.004 in. for the first  $\frac{5}{16}$  in. length of cut and 0.0015 in. for the last  $\frac{1}{16}$  inch. A short tip is usually advisable on cut-off tools. The tip should be no longer than  $\frac{1}{4}$  in. on the narrow ( $\frac{1}{8}$  in. wide) tool shown in Fig. 1.

On long run jobs, the distance between cutting edge and holder can be set so that the chip will curl against the holder, forming a clock-spring type chip. For shorter run jobs, a standard groove or step type chip breaker, as shown in Figs. 3 and 4, can be ground into the tool.

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**for quickly making smooth small-radius bends in pipe, tubing, conduit**

Forming small-radius bends without flattening or kinks is simple, speedy work with a GREENLEE Hand Bender. Ideal in the shop for pipe and tubing installations on machines... especially designed to form neat bends for sharp corners, nooks and other close quarters. Various models and sizes for steel, copper, brass and aluminum tubing or pipe, rigid and thin-wall conduit

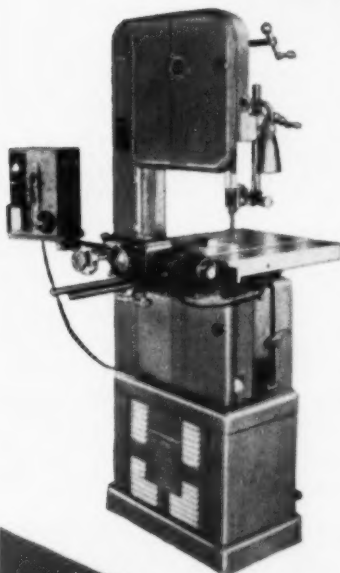
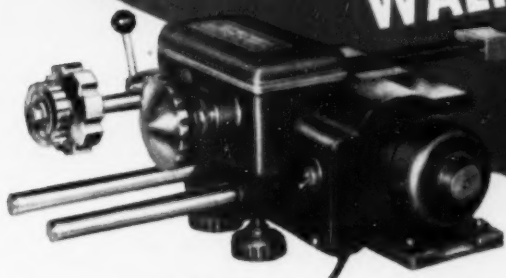


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LATHES • SPINDLE SHAPERS • JOINTERS

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**Drills**—No definite standards for carbide drills have been established. Most large drill manufacturers now furnish carbide drills.

Types of carbide drills (solid and tipped) which have been used to drill

to 0.010 in. depending on drill size. Less than 0.004 in. usually causes rapid cutting edge wear with a build-up on carbide.

For maximum rigidity, the drill should be as short as possible. This

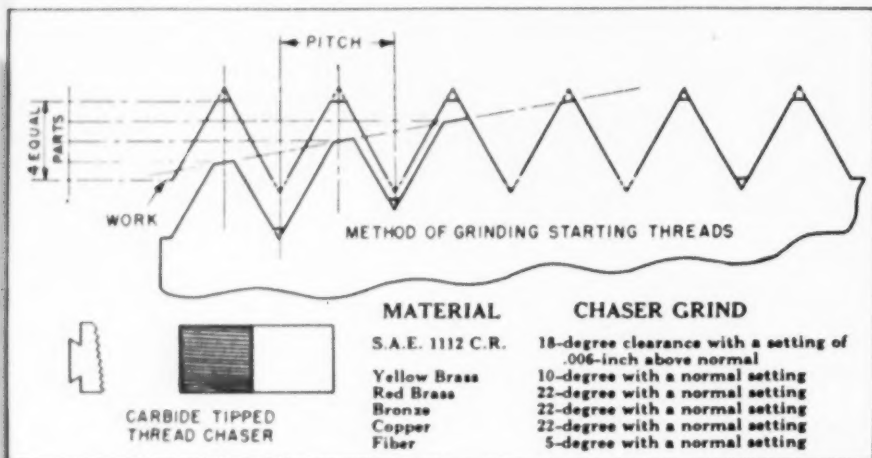


Fig. 8—Method of grinding starting threads on chasers.

brass, bronze, aluminum, plastics, cast irons, and low-carbon free-machining steels such as SAE 1020, SAE 1113, and X1112, are shown in Figs. 5, 6, and 7.

Carbide drills should be run about 3 times faster than HSS drills. Feed per revolution should be from 0.004 in.

does not sacrifice drill life, since sharpening does not shorten a carbide drill to the same extent as HSS drills.

When drilling steel, it is preferable to spot drill first. "Oil hole" type drills (such as the "all depth" drills) should be used for holes  $\frac{1}{2}$  in. in diameter and larger. A large volume of coolant must

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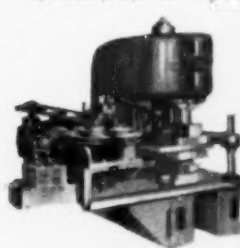
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With harmonic stock feed accessory, the Multipress at left processes up to 50,000 parts per hour through forming, drawing or punching die.



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other production tasks,  
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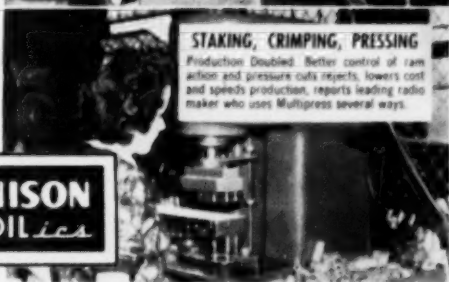
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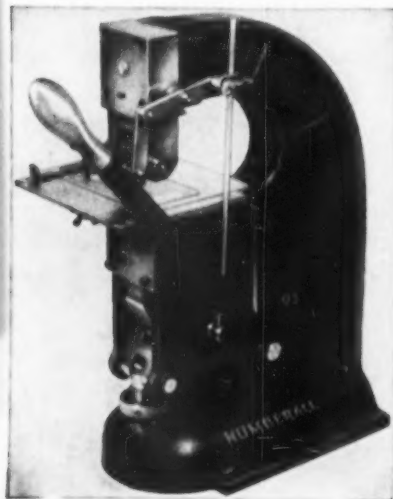
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Model No. 93

**NUMBERALL STAMP & TOOL CO.**  
HUGUENOT PARK STATEN ISLAND 12, N. Y.

be supplied to the end of the tool. Holders must be strong and absolutely concentric.

**Carbide Tipped Chasers**—With carbide tipped chasers, spindle speeds need not be reduced for threading. More pieces per grind are also frequently obtainable, and finish is improved. If desired, HSS chasers, taps, and drills can be used in revolving spindles in the turret to decrease effective cutting speeds (in SFPM) for these tools while maintaining full machine speed for the carbide tools.

As for other types of tool holders, the use of a size larger die head has been found useful with carbide chasers in one plant in view of the greater steel backing and rigidity provided. This plant also developed its own method of grinding the starting threads on the chasers, as shown in Fig. 8. This type of threading is relatively limited with chasers so ground, however. They are well suited, nevertheless, for stud threading or work where the thread is not too close to a shoulder. For SAE 1112 C. R., these chasers were given an 18 deg. clearance with a setting of 0.006 in. above normal.

### Conclusion

In general, the same carbide grades are used for screw machine work as for other types of machines. Where no experience has been had with the use of carbides, it is a good idea to start with the "tough" grades.

For further information on any product mentioned in this issue—use the **READER SERVICE CARD** between the covers.

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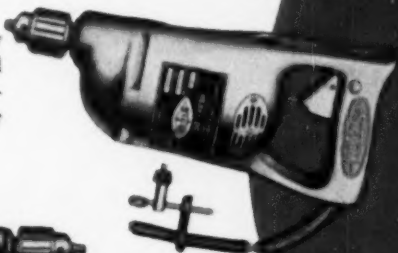
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## SPUR GEAR

32  
20  
1"  
20°  
.005 to .008"  
8 minutes  
.0002"  
.00015"  
.0002"  
.00016"

## Teeth

DP

Face

Pressure Angle

Stock Removed

## FLOOR TO FLOOR TIME

Maximum Pitch Error

Maximum Tooth to Tooth Spacing

Maximum Involute Error

Maximum Base Pitch Error

## 15° HELICAL GEAR

76

8

1½"

20°

.005 to .008"

20 minutes

.00024"

.00015"

.00025"

.00016"

*For complete description of the Reishauer Grinder, write for Bulletin ZA 50.*



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material around it for  
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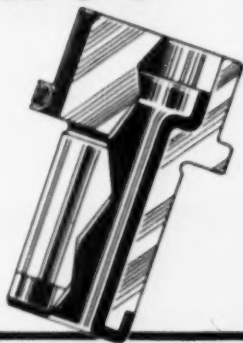


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# Machining The Ford And Mercury Axle Shaft

This article discusses the fast setup in Ford's Mound Road, Detroit plant for machining axle shafts forged and heat treated in the Ford Canton, Ohio forge shop.

By HERBERT CHASE

**U**NUSUAL facilities for forging shafts for rear axles of Ford and Mercury cars at Ford's Canton, Ohio forge shop are matched by a correspondingly efficient setup for machin-

ing these forgings at the Ford Mound Road plant in Detroit. Forgings are delivered to the latter plant strapped to skids in motor trucks. Each shaft includes a 6¼-inch flange from which

the shaft proper tapers to a neck adjacent to the inner end where there is a cylindrical portion larger than the neck on which, after preliminary operations, a spline is cut. The shaft with the

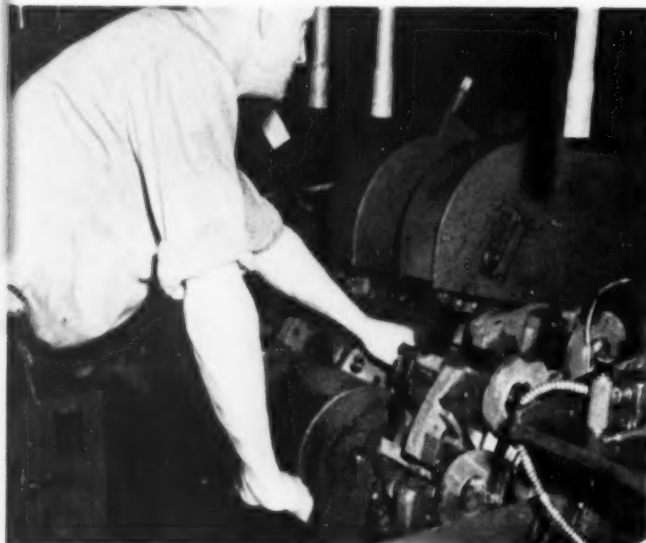


Fig. 1—View of machines used to drill driving holes in the flange and mill the opposite end of each shaft as it is advanced in a drum type fixture to which the shaft is locked by a chain.



Fig. 2—Lathe setup in which all turning on each shaft is done at a single setting and the flange is faced.

chining operations. Now, however, the recess is eliminated and driving is done by two half-inch holes.

The flange has ample strength without being hardened and can be machined more easily, of course, in its natural

exception of the flange (which remains soft) is heat treated, grit blasted, and straightened at the forge plant. No machining is required between the flange bearing and the splined end; however, the latter and the flange require several machining operations, as described in the following paragraphs.

Until recently, a punch used in the up-setter which produces the flange left a cross-shaped recess at the center of the flange. This recess mated with a dog designed to drive the shaft during ma-

state. Moreover, machines can be set for fast turning at the heat-treated end that is to be splined and



Fig. 3—One of the 10 x 36-inch machines in which bearing diameters of shafts are rough ground.



Fig. 4 — Partial view of machine in which shafts are indexed around a table while five bolt holes are drilled, reamed and chamfered.

still not have excessive cutting speeds at the larger diameters of the soft flange.

When received in the Mound Road

and loaded horizontally in the drum type fixtures of four millers, as shown in Fig. 1. The fixtures turn slowly about their axes; however, the shafts

plant, the forged shafts are unloaded from their skids and are hung on a chain conveyor by hand. Upon arriving at the first group of machines in the line, the shafts are taken from the conveyor



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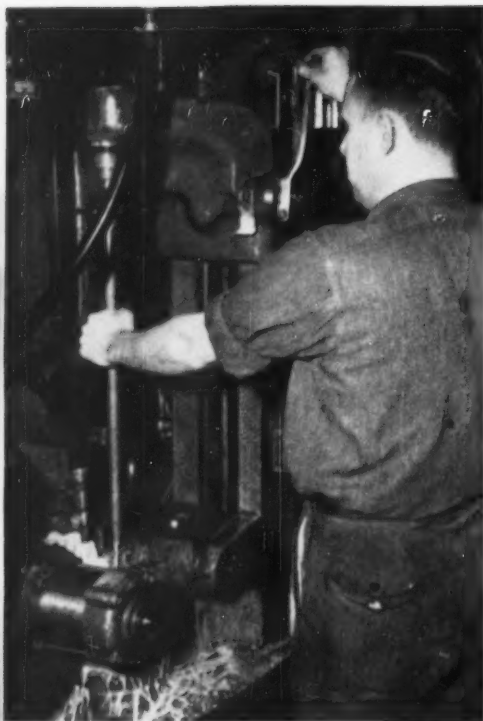


Fig. 5—Splines are cut in shafts on vertical hobbing machines, a single station of one such machine being shown here-with. Hobs turn continuously as the work is advanced around the table.

do not turn relative to the fixtures but instead move around with them. In these fixtures, both ends of each forging are center drilled and two  $\frac{1}{2}$ -inch holes are drilled in the flange pilot. Negative-rake milling cutters remove  $\frac{1}{32}$  to  $\frac{1}{8}$  inch of metal from the small

ends of the shafts in roughing and finishing cuts that bring the shafts to finished length.

Chains held under tension wrap around most of the circumference of the drums and hold the shafts firmly in the notches of the fixtures while machining proceeds. After passing the tools, the shafts issue into portions of the fixtures not covered by the chains and are thus freed for unloading, which is done by hand, the shafts being hung again on the chain conveyor which continues through all stations where subsequent machining is done.

All turning and flange facing operations are performed in a battery of eleven lathes, as shown in Fig. 2, each lathe having duplicate tooling which includes thirteen bits. Each bit has a carbide tip of K-3-H (92 $\frac{1}{2}$  hardness) or equivalent grade, and most of the tools are ground with a 7-degree



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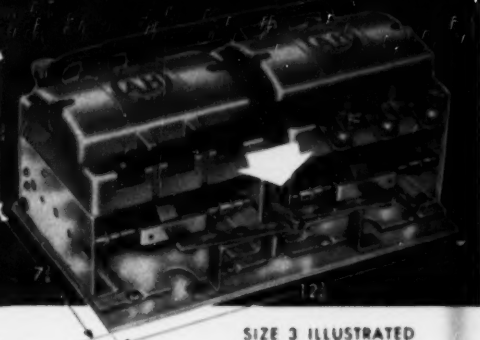
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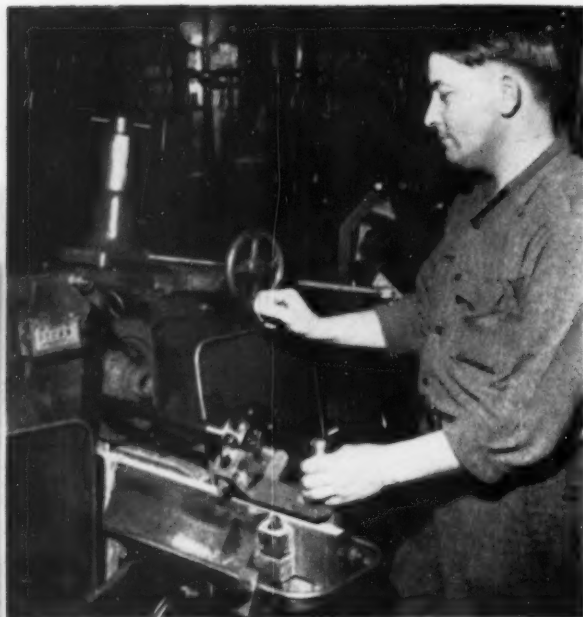


Fig. 6 — Centerless grinders of the type shown are used in finish grinding the oil seal and one bearing diameter of each shaft.

negative rake. Front tools are cam-operated. The remaining tools are set either on the vertical slide or on two back slides. All tools are arranged to make their cuts and retract automatically. Once the shaft is loaded by hand, the machine completes its full cycle automatically and stops for unloading and reloading.

In each lathe, the work revolves at 500 r.p.m. on centers. Operations per-

to size, although some diameters are subsequently ground.

The turned shafts are returned to the conveyor which carries them to a battery of eight grinding machines, where the bearing diameters are rough ground, as shown in Fig. 3. Wheels used in these machines remove 0.025 inch of metal. Loading and unloading are accomplished by hand, the work being placed on centers. This battery

formed include roughing and finish facing of the flange; turning and chamfering the flange diameter; turning two bearing diameters; making one undercut; and forming an oil seal diameter. Except for the flange facing, which is done in roughing and finishing cuts, a single cut brings the work

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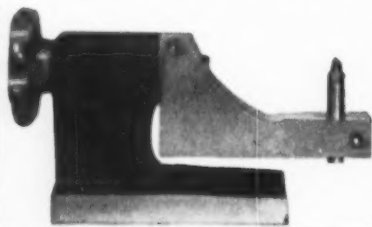
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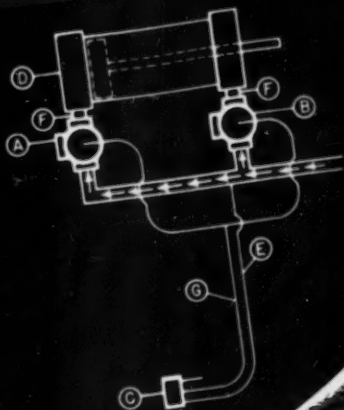
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# How to Boost Production with the Method of Mounting Ross Valves



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Close-coupling of valve to cylinder! That's the story behind the remarkable success of the new Ross In-Line Master Valve.

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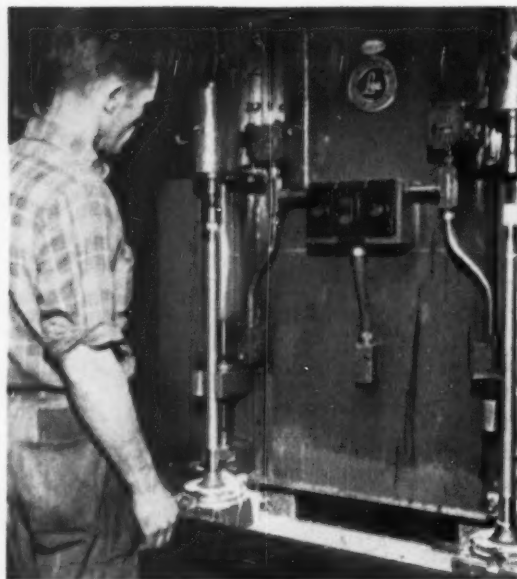


Fig. 7—Drill setup in which the large flange hole of axle shaft is counterbored and chamfered.

of grinders keeps pace with the eleven lathes preceding and with a battery of three vertical Roto-Matic machines to which the shafts are next delivered.

Shafts loaded in these machines (see Fig. 4) are located on a center at the top and on the bearing diameter just ground near the flange. Each machine has eight fixtures holding two shafts each, and the fixtures are indexed around through eight stations of which three are for loading and un-

loading work. Operations performed on each of these machines include the drilling, reaming, and counterboring of six equally spaced holes in the flange and the chamfering of both top and bottom edges of the five smaller holes.

At the first working station, five holes of 0.593-inch diameter are drilled and, at the second station, a sixth hole of  $1\frac{1}{8}$ -inch diameter is drilled. Counterboring of five holes to  $1\frac{1}{8}$ -inch diameter is performed at the third station and, at the fourth station, the five smaller holes are chamfered at both ends. This operation is performed by a single necked tool at each hole. At each side of the neck of this tool is a 45-degree land on which the teeth that do the chamfering are cut. The tool is held in a special holder which is designed to offset the tool and cause it to follow an eccentric path while continuing to turn about its own axis. Offsetting occurs when the tool has

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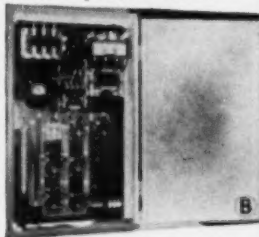
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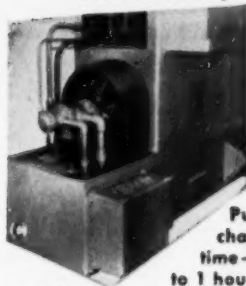


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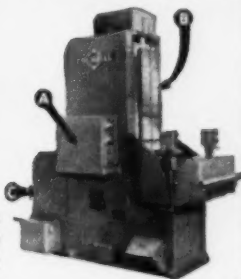


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Standards  
were set  
up as a  
goal



... by the Joint Industry Conference of major users and manufacturers of machine tools and accessory equipment. Covering hydraulic and electric operation, they set forth what is IDEAL machine design to insure absolute MINIMUM DOWN-TIME, and MAXIMUM ACCESSIBILITY and SERVICEABILITY of operating units, plus MAXIMUM OPERATOR SAFETY.

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Fig. 8—This illustration shows one station of a machine in which shafts are set and rotated in a vertical position while the oil seal diameters are lapped to a 15 micro-inch finish.

been fed to a specified depth, at which time a bushing around the tool strikes a shoulder to effect the offset. The amount of eccentricity, which is controlled, determines the depth of chamfer produced. Each tool is so proportioned, of course, that both ends of the corresponding hole are chamfered

simultaneously. When chamfering is completed, the tools are automatically returned to center and retract.

After indexing to the fifth working station, each of the five small diameter holes is reamed to size, the reamers being held in floating holders. After completion of the reaming operations, the shafts are removed at one of the two next stations of the Roto-Matic and placed back on the conveyor chain.

The shafts are next conveyed to a battery of six vertical machines for hobbing of the splines. Each of these machines has eight stations and of these only one is for loading and unloading purposes. Shafts are placed vertically between centers, as shown in Fig. 5. After each shaft is loaded and moved to the next station, the hob begins its cut as the shaft turns slowly about its own axis. As the cutting

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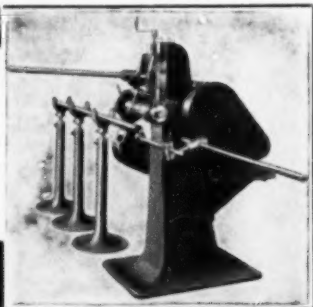
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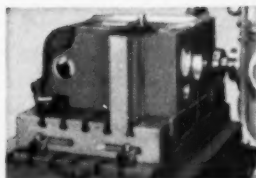
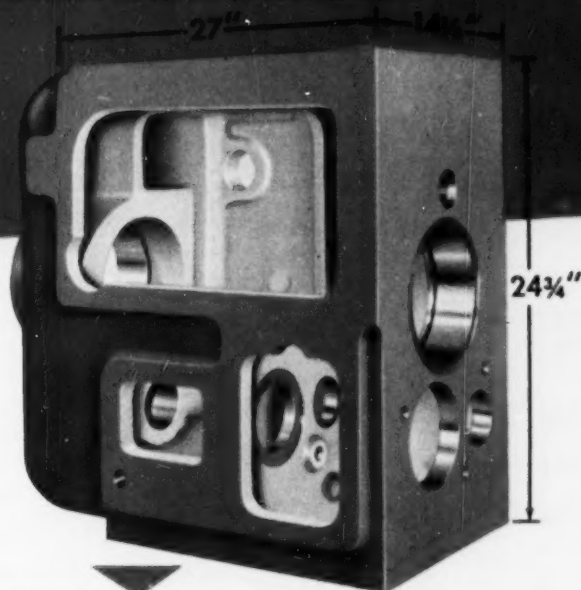
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proceeds, the shaft, holder and hob continue their motion around the table, which turns slowly. By the time the shaft returns to the unloading position, the splining operation is completed, the hob stops, and the shaft is removed. The hobs cut all surfaces of the spline, including the o.d., no grinding of the outer diameter being required.

After splining, the shafts are placed back on the conveyor for transfer to a battery of five centerless grinders, as

shown in Fig. 6, where one bearing and one oil seal diameter are finish ground. Mean bearing size is 1.365 inch and is checked by air gage located on a holder attached to each machine.

Shafts are next conveyed to a group of two-spindle drills which counter-bores and chamfers the inner end of the large flange hole of each shaft, as shown in Fig. 7. Each machine is provided with a fixture under each spindle. These fixtures are used alternately;

one is loaded while the other is used in chamfering a shaft.

For the final operation, shafts, are conveyed to two super finishing machines, each of which polishes the oil seal diameter of the shaft, as shown in Fig. 8. Each of these machines is designed to handle six shafts at a time, each shaft being rotated about its own vertical axis and, at the same time, being reciprocated axially. The shafts are carried around the turntable of the machine as polishing proceeds. While being polished, the oil seal diameter is in contact with a 600-grit stone press-

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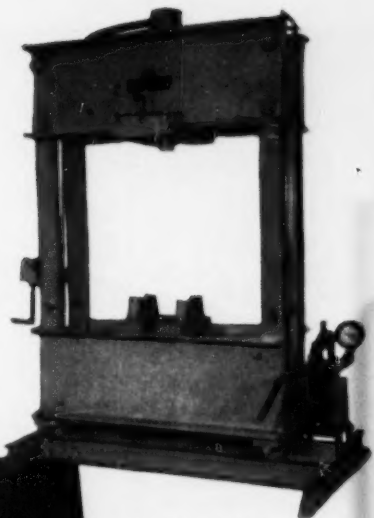
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STANDARD 150 Ton Shop Press with new Rodgers 4-speed Hand Pump.

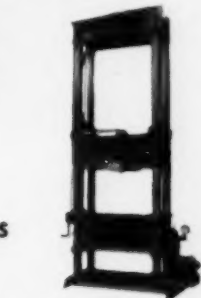
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ed against the diameter by a spring. When the shaft moves back into the loading station, the rotary and reciprocating motions cease, the shaft is removed and another shaft is put in its place.

Upon completion of the polishing operation, the axle is ready for transfer to the assembly department except for final gaging and inspection. Although not mentioned above, several gaging operations are performed on the shafts between the various machining operations. If shaft dimensions are outside the limits specified, the machines at fault are stopped until properly adjusted to correct the difficulty.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.

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# Hot Dip Coatings Protect Tools and Parts

**Procedures and equipment used in Northrop Aircraft machine shops for applying the coatings are explained.**

By GRAYDON R. MACE

**A** HOT dip liquid plastic material that forms a semi-transparent and impervious film over parts treated is finding wide use in the machine shops at Northrop Aircraft, Inc., Hawthorne, Calif. Recommended by the AAF and adapted to use by the Northrop process engineering department, the coating is used to protect the cutting edges of tools during storage, critical machine parts during shipment, and to "cap" the ends of production tube parts to prevent interior contamination.

The plastic material used conforms to the Army-Navy Specification AN-C-117 and is available from a number of concerns. The material, a rubbery solid when cold, is melted in a thermostatically controlled electric heating pot. Optimum temperature is about 310 deg. F. When used at lower temperatures, the film on the dipped part is needlessly thick, and when heated above this temperature, the plastic undergoes dark discoloration caused by charring of certain organic constituents. Basically, the material is composed of about 10 per cent mineral oil

dispersed in a vinyl chloride plastic solution.

The film provides absolute mechanical protection from ordinary abrasion and blows, and coated steel parts have showed no signs of corrosion or rust after many hours in a salt spray cabinet. The film peels off easily and can be remelted and reused until normal contamination dictates otherwise. Reuse, however, with normal contamination, will result in some dark discoloration of the material.

By far the widest application of the film in the Northrop shops is for cutting tool protection. Such tools as milling cutters, reamers, end mills, large taps and large drills are kept constantly coated except when in use. When such a tool is withdrawn from the crib, the coating is peeled off and saved. When the tool is returned, it is coated again before being placed in its proper bin. Only the critical cutting edges and surfaces are coated. The periphery of circular tools is merely spun through the hot plastic material and the shanks of drills and taps are left uncoated.

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can pay off for you, too...

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GRINDERS that reduce costs on every type of surface grinding.

CHARLES H. BESLY & COMPANY

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The worker at the left is shown dipping a tool in hot liquid plastic. The Northrop process engineer at the right demonstrates the ease with which plastic coating can be removed.

Coated tools may be tossed haphazardly together in a crib bin without danger of dulling a cutting edge. A tool may be dropped on a concrete floor, bumped against metal, or suffer more than normal abrasion without affecting it in the least. No special cleaning is required prior to coating. Surface grease, oil and cutting fluid is merely wiped away with a tack rag. It has been substantially proved that the coating will provide absolute protection to tools which must be stored under corrosive atmospheric conditions.

The coating is also used for protecting machined parts and surfaces during shipment. In this case, the part is completely immersed in the hot plastic to form an air and moisture-tight plastic envelope. The film provides dual protection from mechanical injury and corrosion. The ends of production tube parts, incorporating AN fittings, are first capped with conventional plastic caps and then dipped in the liquid plastic to provide a double

measure of protection against interior contamination.

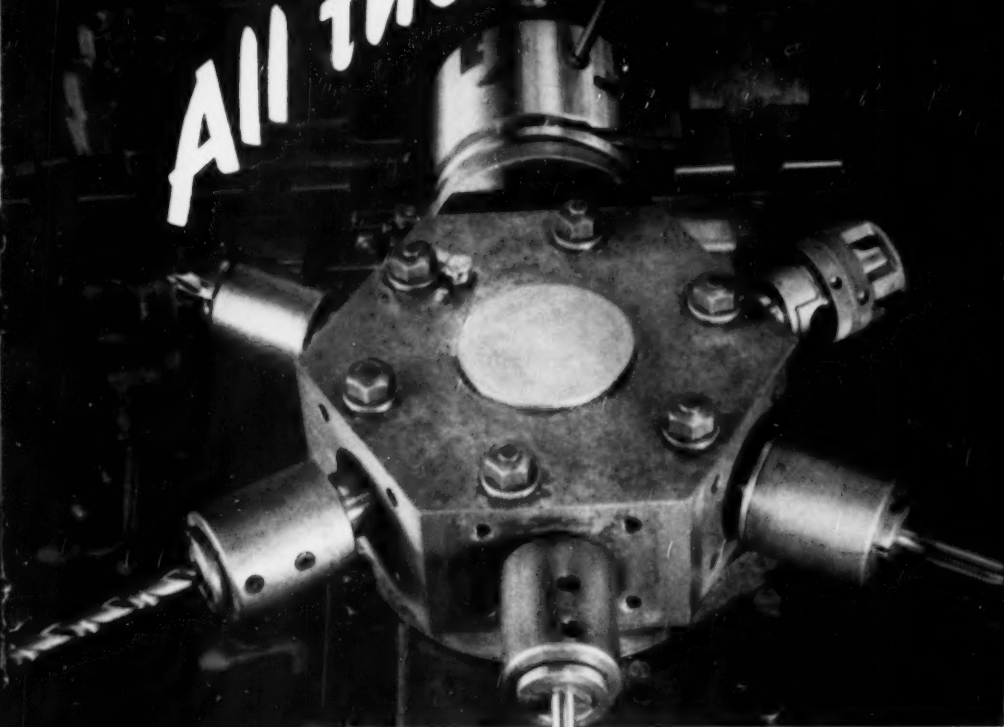
There is no problem of draining or drying parts after dipping. The chill metal surface of the tool or machine part "sets" the coating almost immediately

so that the part may be laid upon a hard surface without danger of injury within seconds after it has been withdrawn from the dip. Normal coating thickness when applied at a temperature of 310 deg. F. is approximately  $\frac{1}{8}$  inch.

A heating pot of approximately one-gallon capacity is used at Northrop for all tool coating, tube capping, and the majority of production machine parts. The pot is kept covered except when in use to prevent contamination, retain heat, and subdue odors.

Cost of installing the process is limited to an initial supply of AN-C-117 plastic and an electric heating pot. Operational costs are limited to the electric current used, time consumed in dipping, and occasional replacement of the AN-C-117 plastic when it becomes contaminated from use or when it is shipped out of the plant. Northrop engineers are satisfied that the total cost is insignificant in comparison to advantages obtained.

# All these



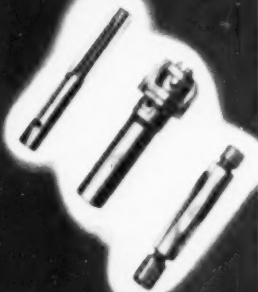
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REAMERS	7/0	2 1/2"
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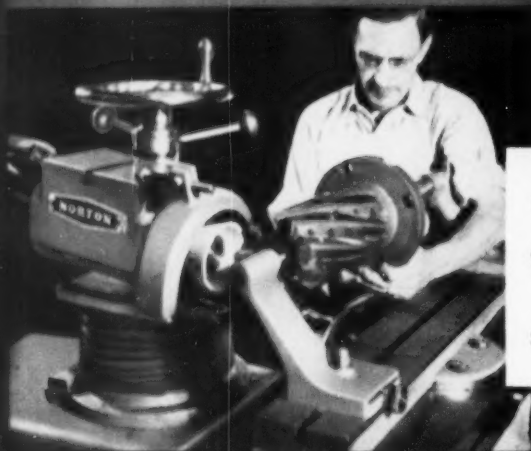
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- 1 Tilt Wheel Head up for desired clearance angle
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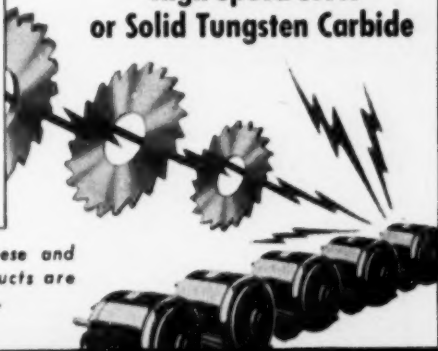
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# Aspects of Modern Honing

Features of honing stones—Methods for removing crosshatched scratches—Honing of non-ferrous metals—Application of electric timers to honing—Electric size control in honing

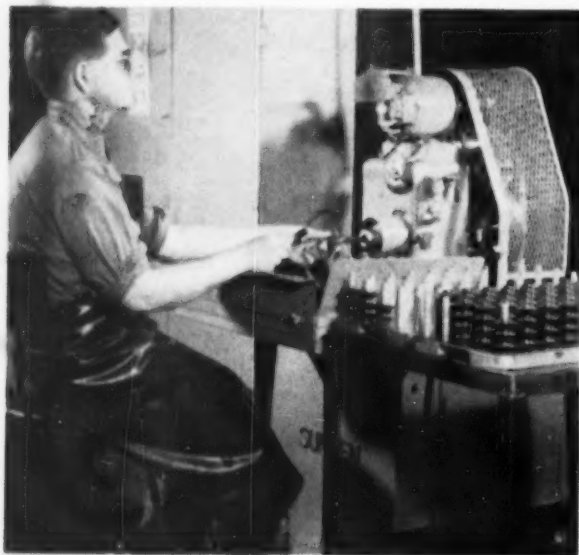
By JOHN E. HYLER

**H**ONING machines have made many advances since the early days. In general, where practical a honing machine is so made as to travel the honing tool vertically. A vertical honing machine is not practical, however, where extremely long bores are to be honed. So far as we know, a ver-

tical honing machine handling bores approximately six feet in length is the tallest honing unit that has been built. Horizontal honing machines have been made which have a spindle stroke up to 75 feet in length. In any case, the honing tool has a body which is adapted for holding a number of abrasive

stones. Different methods are employed in different cases for expanding the stones against the surface of a bore while the honing tool is being revolved and reciprocated through the bore at the same time.

Stones for application to honing tools are available from various



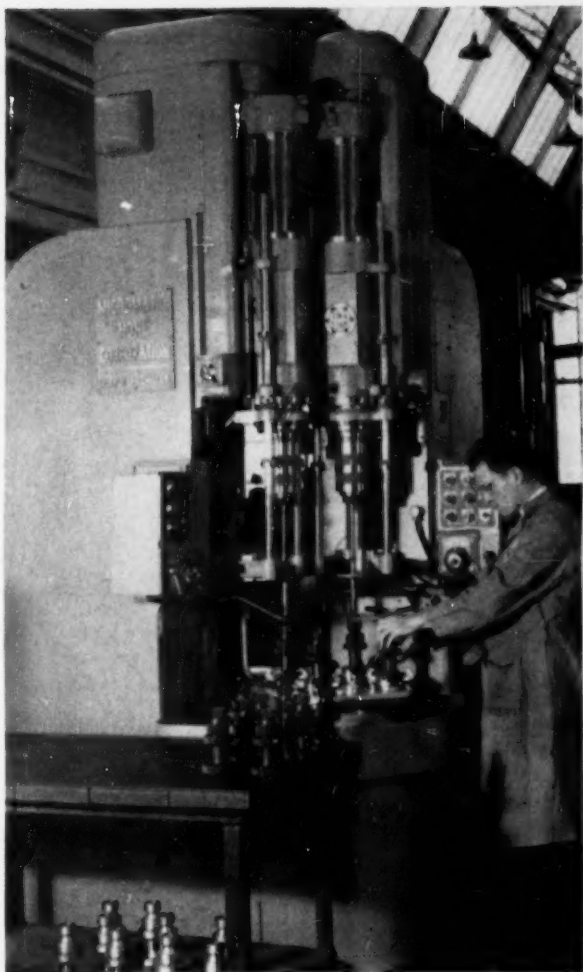
Honing machine equipped with three-point mandrel design for producing round, true holes of the desired accuracy. (Illustration courtesy Sunnen Products Company.)

Shown herewith is a double spindle Hydrohoner in operation honing cluster gears. This machine is equipped with electronic Microsize control and an automatic rotary indexing fixture. Two gears are honed simultaneously. Removing 0.004 inch stock, the gears are held to a tolerance of less than 0.0003 inch on diametric size and geometry. Time cycle for two gears is 30 to 35 seconds. (Illustration courtesy Micro-matic Hone Corporation.)

man u f a c t u r e r s of grinding wheels and other abrasive products. These stones are made up of artificial abrasives and are available in different grit sizes, as well as in soft and hard bonds. In honing stone selection, the user has the same problem as that involved in the selection of grinding wheels, in that soft stones will cut at a higher rate than hard stones but will also wear faster. Stones which are too soft will wear too rapidly. Stones that are too hard will glaze and cut too slowly. With soft stones, grit penetration is actually greater since the bond wears away more deeply, allowing greater opportunity for deeper abrasive grain penetration.

#### Crossed Helices

Since the direction of rotation of a honing tool is always the same and since the stones cut in both reciproca-



tion directions, the helical paths cut by individual abrasive grains in one direction of the stroke cross those made in the other direction of the stroke, thus crosshatching the internally-honed surface at every point. Naturally, the finer the grit used, the less pronounced these crosshatched scratches will be; however, they will still be present regardless of how small

## CHICAGO STEEL PRESS BRAKE

Model No. 131



A new member of the Chicago Press Brake family designed to supplement the larger machines.

Within its rated capacity (11 tons) all operations are handled same as on the larger machines.

All steel construction, enclosed gearing.

Takes up small floor space.

We can make excellent deliveries of this new press.

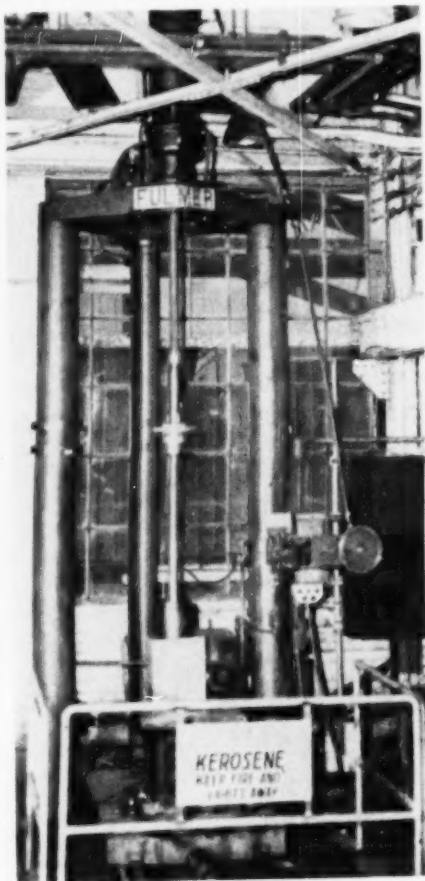
We make complete line of dies for all Press Brakes.

Send for Bulletin 131 for  
further description

**DREIS & KRUMP MFG. CO.**

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ILLINOIS

they may be. In some cases, it is desirable to remove these scratches. The removal can be effected with a



Shown here is a large model honing machine located in one of the largest chemical plants in the country. The workpiece being honed is an alloy steel forged cylinder block for a compressor which operates under 50,000 lb. pressure. The stock removed from the work amounts to 0.010 to 0.012 inch, with tolerances for size being held to plus or minus 0.0001 inch. Honing time is approximately eight minutes. (Illustration courtesy C. Allen Fulmer Company.)

straight-line lapping operation performed by a honing machine equipped with a straight-line lapping at-

in the toolroom...

C/R's

## NEW JAW-HEAD

## Rawhide HAMMER

**adds new convenience to the safety and protection of Rawhide**

Men in the toolroom find C/R's new Jaw-Head hammer a real time-saver. Rawhide faces are replaced in a jiffy—loosen a nut, insert new faces, tighten nut and they are held in a vise-like grip. C/R Jaw-Head hammer faces are made of tough, resilient waterbuffalo hide . . . superior in their ability to absorb shock, deliver powerful blows, and protect delicate finishes. Safety-Flare grip handle prevents slipping. For safety, economy and power, get the new C/R Jaw-Head Rawhide hammer!

- Other C/R striking tools:  
Rawhide Mallets, Rawhide Mauls, Solid Head Rawhide Hammers.



- Out with the old face — in with the new!



To release jaws, loosen this nut.



Change to new C/R Rawhide faces.



To tighten nut, use wrench for best results.

Available from leading Industrial Suppliers.

**CHICAGO** *Rawhide* **MFG.CO.**  
1207 Elston Ave. Chicago 22, Illinois





Multiple spindle honing machine, equipped with four hones, operating in production on cylinder liner sleeves for a well-known make of tractor. (Illustration courtesy Moline Tool Company.)

tachment and using only a reciprocating action of the tool. In some instances, cast iron laps have been used in honing tools for removing cross-hatched scratches. Some time ago carbon pads were made available for applica-

tion to honing tools for scratch-removing purposes, although we are not certain these are still available and in use. In most cases, however, the fineness of finish obtained through use of a 400 or 500-grit abrasive in the regular honing



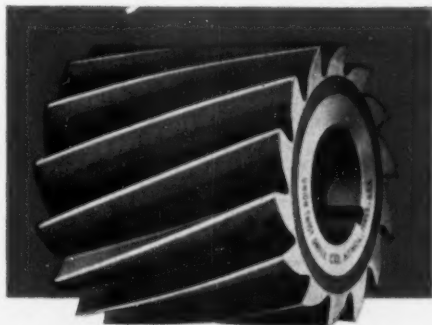
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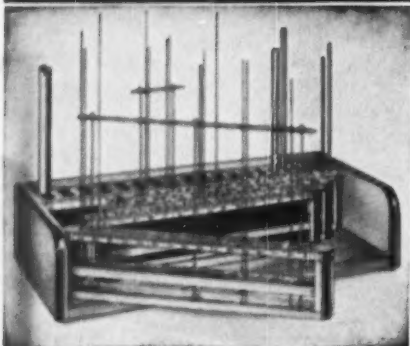
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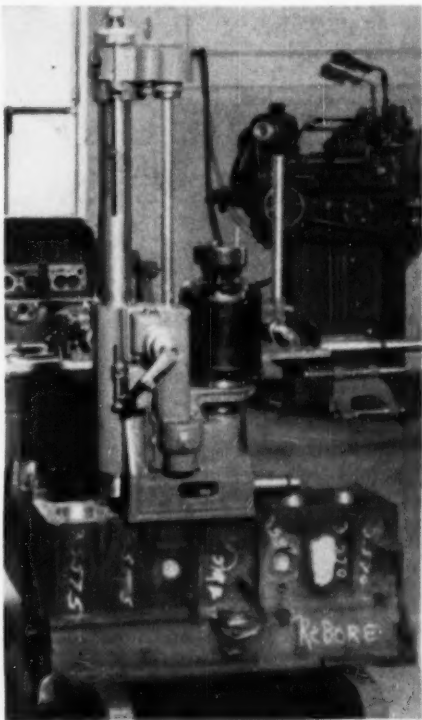


## ACRO METAL STAMPING CO.

336 E. RESERVOIR AVE., MILWAUKEE 12, WIS.

operation is considered adequate.

It has always been considered imperative that some operation must be performed preliminary to honing that would leave the hole just enough smaller than the required honed-to-



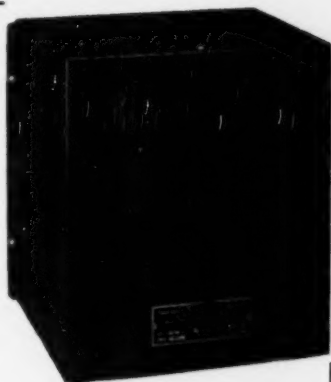
Portable honing machine in position on motor block for honing cylinder walls. (Illustration courtesy Lempco Products, Incorporated.)

finish size that the tool marks might be completely removed by honing. Fine boring, grinding, or reaming is still considered necessary in some cases; however, with some of the modern honing tools now being used, thicknesses of stock up to approximately  $\frac{1}{8}$  inch can be removed from some diameters due to the possibility of applying larger



**NEUTROL**  
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## WHEREVER MAGNETIC CHUCKS ARE USED



THE ELECTRO-MATIC RECTIFIER AND NEUTROL MAGNETIC CHUCK CONTROL ARE INDISPENSABLE FOR BETTER AND SAFER GRINDER PERFORMANCE

NEUTROL Magnetic Chuck Controls speedily release and demagnetize workpieces. With NEUTROL, there's no need to hammer or pry to release the work. This saves time and tempers—saves marred, distorted workpieces and prevents damaging of chuck faces. NEUTROL also protects chucks against harmful voltage surges.

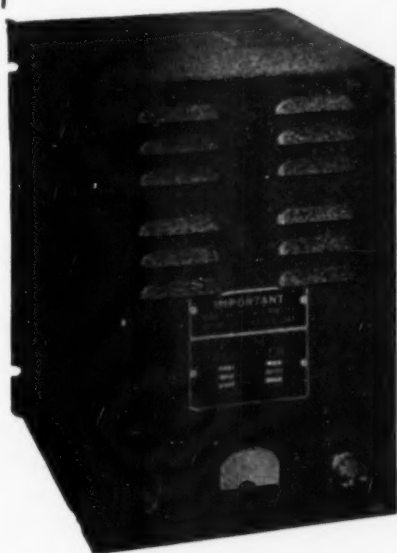
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Rectifiers

amounts of torque to the honing machine spindle and greater expansive pressure of the stones against the walls of bores. As a result, preliminary operations need not be performed with quite as much care in any case, and there are a large number of cases in which preliminary operations may be dispensed with entirely.

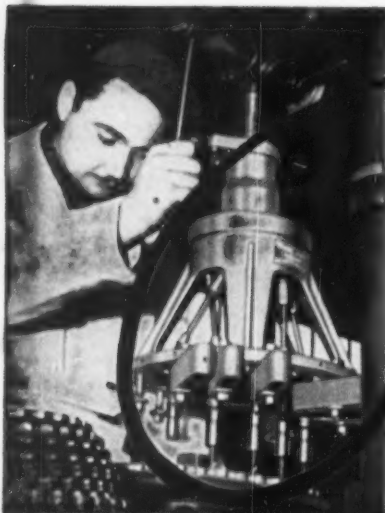
No difficulty is experienced in honing cast iron of any type or hardness. Honing can also be performed on all kinds of steel, regardless of the type of heat treatment to which they may have been previously subjected. A single honing operation is usually ample for most types of work. However, there are cases in which it appears advantageous to hone parts both before and after hardening. An outstanding instance in point is the honing of gear blank bores before the gear teeth are

machined. Such a procedure enables the accurate, preliminarily-honed holes of the gear blanks to be used for locating them on the gear cutters, thus maintaining concentricity within very close limits. After cutting the gear teeth and hardening the gears, the holes (left somewhat undersize in the preliminary honing) are finally sized by a finish honing operation.

#### Honing Non-Ferrous Metals

Non-ferrous metals may be successfully honed, provided they do not clog or load the stones and thus render them non-cutting. Some non-ferrous metals have a structure which allows them to be honed with fair success without any particular attention. One very effective method for preventing honing stones from loading up with brass or bronze particles is to dip them

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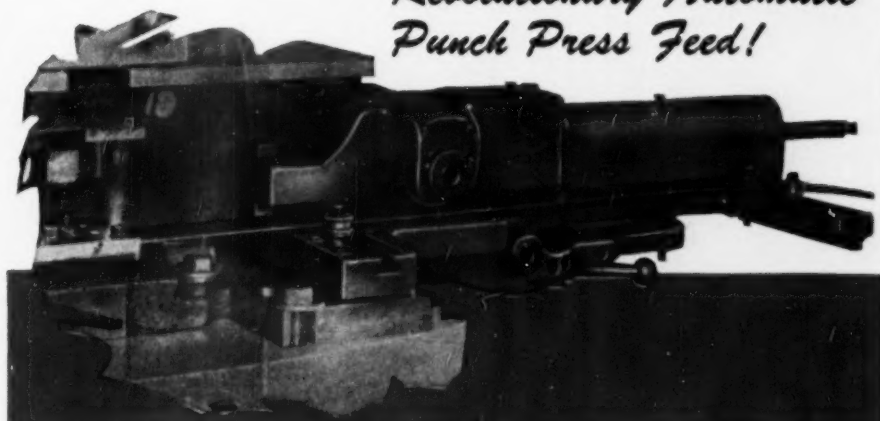
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**Product of Commander — Builder of the Commander Tapper**

# New

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*Revolutionary Automatic  
Punch Press Feed!*



### A COMPACT SELF-CONTAINED CAM DRIVEN FEED

#### GENERAL SPECIFICATIONS

##### CAPACITY

Handles coiled or short strip up to 3/16" thick and any width developed for a given thickness of stock where weight of stock does not exceed 2 pounds per linear foot.

##### MAXIMUM FEED LENGTH

9" on presses having 3" or more of stroke and approximately three times the stroke for strokes under 3". Feed length adjustable in increments of .001".

##### MOUNTING SPACE REQUIRED

For Feed - 3" x 9" Wide  
For Cam - 2" x 2 1/4" Wide

##### PHYSICAL DIMENSIONS

Length Overall - 22"  
Width Overall - 12"  
Height Overall - 7"  
Shipping Wgt. - 100 lbs

This New Revolutionary Dickerman Rol-Di-Feed is a compact, self-contained Cam Driven Feed which can be easily installed on press bolster or directly into some die shoes to feed stock in any desired direction.

It will feed metal, fibre, paper, mica, plastic, etc., in unlimited range of width, from continuous coils or short lengths. Provides increased range and versatility seldom found in larger, more costly feeds.

Install this New Dickerman Rol-Di-Feed for simplicity, adaptability, economy and feeding accuracy. Write for detailed information and price.

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## MANUFACTURING COMPANY

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Illustration showing a twin cylinder, hydraulically reciprocated honing machine, arranged with 25-inch spindle travel, being used to hone air-cooled motor cylinders. This machine is equipped with a two-spindle, fixed center, anti-friction bearing heavy-duty auxiliary head and fixture for holding the cylinders on an hydraulic lateral indexing table. (Illustration courtesy Barnes Drill Company.)

repeatedly while new in hot paraffin. Such dipping will cause all the interstices of the stones to be filled with wax, thus preventing brass or bronze particles from readily finding deep anchorage. Some of the leading manufacturers of honing machines and tools, it is believed, are advocating the use of resinoid bonded and impregnat-

ed cork sticks for honing non-ferrous metals.

An interesting feature of one modern large-sized honing machine is the facility with which workpieces of

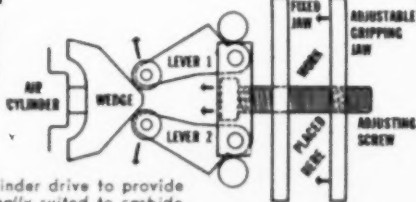
large size can be loaded and unloaded. Since each workpiece is located directly under the spindle for honing, it cannot ordinarily be put in position by any standard handling equipment, nor can it be unloaded by any such equipment. The honing machine under discussion, however, is provided with a ball-bearing sliding work table having 48 inches

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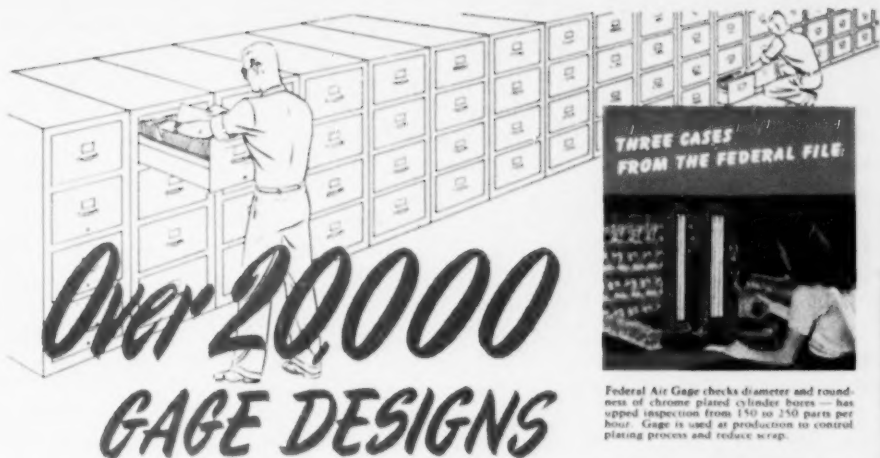
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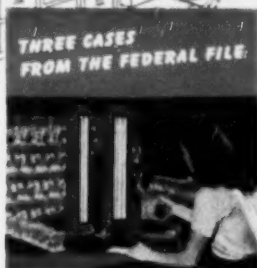
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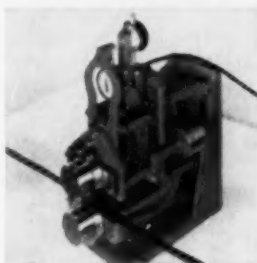
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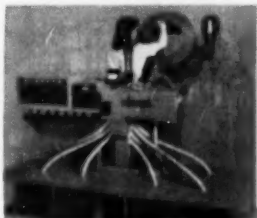
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Federal Air Gage checks diameter and roundness of chrome plated cylinder bores — has upped inspection from 150 to 250 parts per hour. Gage is used at production to control plating process and reduce scrap.



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Electronic Sorting Gage segregates cylindrical parts into 4 U.S. diameter groups, over and under diameter groups, and over and under length groups. Speed — 1600 parts per hour. Diameter tolerances—.0001" per group.



of travel on a horizontal track. The table is moved out to the front of the machine where a workpiece can readily be unloaded and another workpiece placed on the table with any convenient shop crane. The table is then slid back under the spindle again for honing the work.

Best results in honing depend in no small degree on using the proper relationship between rotary and reciprocating speeds. In order to obtain the best possible relationship under varying conditions and in honing different diameters of bores, a machine should have a wide range of rotary speeds, as well as a wide range of reciprocating speeds. In general, both rotary and reciprocating speeds will be higher for cast iron than for steel, although the relationship between those speeds need not vary appreciably. Generally, if an operator aims at making the included

angle between stroke helices approximately 50 degrees and does not miss by more than 10 to 12 degrees in either direction, he will obtain at least fair efficiency insofar as this factor is reflected in results. The operator may vary, in either direction, the relationship between rotary and reciprocating speeds and tabulate results obtained until he has arrived at the best combination for any given type of work which he must handle repeatedly.

One factor to be considered in setting a honing machine for length of honing tool or spindle stroke is the necessity for a small amount of overhang of the honing sticks at each end of the spindle stroke. The actual length of the spindle stroke, however, is modified by the length of the stones in relationship to the length of the bore in connection with the required amount of overtravel. For example, if an op-

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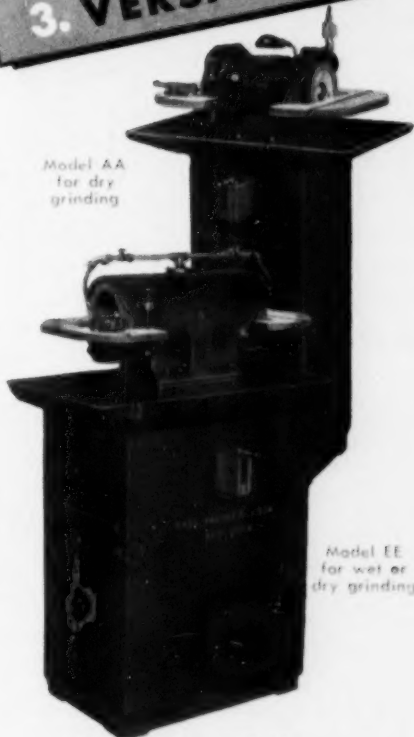
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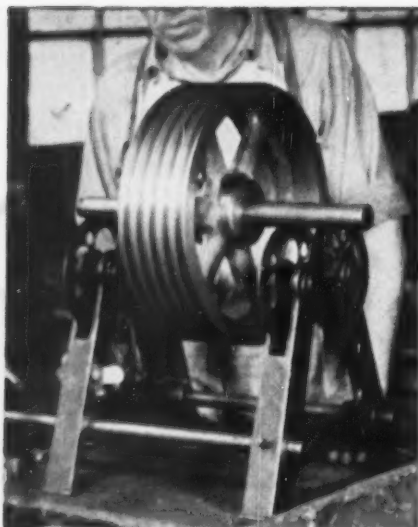
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21 in.	20 in.	12 lbs.
21 in.	20 in.	800 lbs.
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Any	Any	24,000 lbs.
43 in.	30 in.	800 lbs.

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**Sundstrand Machine Tool Co.**

2539 Eleventh St., Rockford, Ill., U.S.A.

erator is honing a cylinder 12 inches in length, if he is allowing an overtravel of one inch at each end of the cylinder for preliminary trial, and if the stones are 4 inches in length, the length of spindle stroke will be (12 inches minus 4 plus 2) 10 inches. Use of a correct amount of overtravel will result in the production of straight holes having neither restrictions nor bellmouths at their ends. Obviously, if the preliminary tryout shows the ends of the bore to be restricted, it will be necessary to lengthen the stroke somewhat for another trial, and vice versa, until proper results are obtained.

### Electric Timers

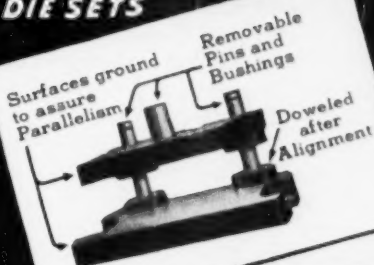
Electric timers are applicable to certain phases of honing and are found in use on various machines. One manner in which a timer has been utilized in honing involves arrangement of the timer in such a way as to cause the hone to withdraw from the work after the spindle has made a predetermined number of strokes or cycles. Such an arrangement is for mass production work. Electric timers are also employed on some modern honing machines to control the length of a dwell interval required when honing up to the head ends of blind cylinders or when honing up to internal shoulders.

A short dwell is necessary in the reciprocating action of a honing tool when honing up to internal shoulders or blind ends of holes for the same reason that overtravel is required at the ends of cylindrical bores of open type. This dwell period is short and many times is further shortened by making small-depth recesses at the bottoms of such holes and/or against such internal shoulders when performing a preliminary boring operation.



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Being originators of Standard Die Sets naturally we are steps ahead in Design—Precision—Dependability and Economy. Baumbach Die Sets can be disassembled. The Leader Pins and Bushings can be used on other size Die Sets—reducing inventorying a lot of Die Sets. Costly machining time is also reduced. Learn all about Baumbach advantages before you buy. Write for circular.

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In 19 sizes, ranging from  
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In one certain type of honing machine, a so-called "stop-and-dwell" system is incorporated, which allows the spindle to be stopped at any point in its longitudinal travel without any shock or impact either to the work or to the machine. While stopped, the spindle is under electric-timer control with regard to dwell duration. During the dwell interval, the reciprocating mass is held in position on a "locked-in" column of hydraulic oil. The electric timer employed in this case provides for adjustment of the dwell period to any point within a 1/10 to 30-second time range, although this is a far greater range than is actually needed or employed. We do not mean to say that all modern honing machines have their longitudinal dwell controlled in the manner cited, since some units employ other means for the purpose.

#### Electric Size Control

Electric timers are also used on some modern honing machines to control the duration of a so-called "run-out" period for the honing tool in connection with electric size control. One of the leading builders of honing machines and tools has perfected two different types of automatic size control, each of which imparts a "to-size" signal to an electronic tube by means of a low-voltage circuit closed by a mechanically actuated mechanism linked to the honing tool. The voltage in the circuit closed in this manner is too low to cause any arcing between the contacts. The electronic tube, in turn, closes a powerful secondary circuit, thus causing, in proper sequence, the expansion of the honing tool to cease, a proper runout period for the honing tool to be timed (through the

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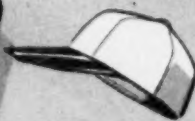
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# Everywhere—hats are off to the SIZE-MARK on PARKER-KALON Socket Head Cap Screws



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welcome it because sorting is made so much easier and quicker . . . a glance at the head of a P-K Screw immediately tells you its size.



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are all for it because sizes are always issued correctly. The Size-Mark prevents delays, helps them make better time on the job.



## APPRENTICES

cheer the Size-Mark on P-K Screws because it protects them from errors . . . enables them to learn sizes faster and do a better job.



## SALES MANAGERS, TOO

hail the Size-Mark on P-K Screws. It's a definite sales advantage because it saves time for customers' service men in reassembly.



## NEW . . . .. Size-marked Engineered Hex Keys



And the GEAR GRIP† prevents slipping — even when fingers are oily! Send for samples . . . see for yourself how P-K\* Size-Marked Socket Head Cap Screws can put your product ahead, assembly-wise and sales-wise. Parker-Kalon Corporation, 200 Varick Street, New York 14, N. Y.

Key size, and corresponding socket set and cap screw sizes, are clearly stamped on the arm of Parker-Kalon Engineered Hex Keys. P-K Hex Keys are again available in attractive, compact steel cases with easy-to-use key island (Set No. 111), and in durable plastic pouches (Set No. 45).

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SIZE MARKED SOCKET HEAD CAP SCREWS • GROUND THREAD SOCKET SET SCREWS • FLAT HEAD SOCKET CAP SCREWS  
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electric timer previously mentioned), and the honing tool to be collapsed and withdrawn from the bore.

The so-called gage-ring automatic size control makes use of a solid ring with a carbide insert for gaging, while a split-and-hinged ring is used on what is called gage-bar control, employed on large-diameter bores. Much might be said concerning both of these methods of automatic sizing if space permitted, since both are highly interesting and efficient. Where either method is used, handling costs, inspection and scrap are generally reduced a substantial amount.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.



"Thanks Very Much . . . I'll Return It at the End of the Tour!"

## You should know **MORE** about **FULMER HONING MACHINES**

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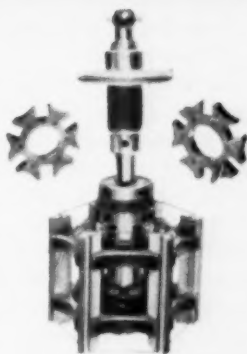
★ **WRITE FOR NEW HONING BULLETIN, fully illustrated.** Gives valuable information on honing applications, **Alexander Ball** tools, and specification details on all models of Fulmer Honing Machines.



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 $\frac{1}{2}$ " - 4" honing capacity

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# Look Ma --- No Hands!

**Here the author tells about a screw machine department that is being operated without the aid of inspectors.**

By CLIFFORD W. KENNEDY

**L**ETTING today's manufacturing departments produce without inspection or inspectors sounds almost as Utopian as running the Government without taxes. Some form or degree of inspection system has become as much an integral and habitual part of most modern industrial plants as the telephone operator, fire protection or cost records, and how firm a clutch the shop and inspection have on each other is seldom realized until a definite effort is made to eliminate the inspection service.

Historically, inspections have frequently been born in emergency. There would be the case where the big boss called a conference or came out on the floor waving an irate customer's letter. The solution of the trouble would be all too often having an inspector assigned to the job. The boss, having meant only to establish a temporary palliative, walked off and forgot what he had decreed. But not the shop! Temporary routines become habits over night, and habit is shop tradition in a few weeks.

A consistent attempt to get rid of unnecessary inspection can be as revealing, sometimes, as a voyage of discovery, whether the investigation is made in your own shop or the information comes from pointed questions asked during a visit in some other man's factory.

The minute an inspection is established on or for production, whether it be a single machine or operation or for an area, the operators and their supervision commence to lean, consciously or unconsciously, on that inspection. The situation becomes much like that of youngsters living off a father-in-law. Operators readily get into the habit of making no changes or adjustments until the inspector tells them it is necessary. In one experimental case, the inspector made his usual rounds and went through all his regular motions except that, deliberately, he failed to notify the operator of substandard work. By the end of that day 68 per cent of the pieces the operator had produced were out-of-tolerance.

Many places the factory routine calls for inspection checks on hourly, daily or half day batches of work. Necessarily the inspections are made anywhere from half a day to several days after the actual work is done, and the results are reported back to the production area then.

Production people are present minded, realistic. That which is going on during the existing interval is what counts. Yesterday is gone, tomorrow hasn't happened yet; even the importance of today is frequently shrugged off. What some inspector in a distant crib finds out or thinks this afternoon

Each operator was provided with a copy of the table shown here.

or tomorrow about work completed hours or days ago registers only too dimly on an operator's mind tangled up with what's happening right now.

Added to that implied above is the eternal, potential difficulty of differences in opinion between manufacturing and inspection over what constitutes substandard or out-of-tolerance.

When an honest effort is made to cut inspection down to size, one economic gem shines forth. The nearer to the source the decision is made that work is right or wrong the better will be the product and the lower will be its cost.

Another inspection tactic adopted in many shops is so-called 100 per cent inspection where each and every part, subassembly or assembly is inspected, gaged or tested. Sometimes the 100 per cent routine is adopted in desperation; too many times it is the result of ignorance. To some plant managers, 100 per cent inspection of parts and products seems a logical procedure. But clear thinking is needed here.

The parts or assemblies have all been handled once by a production operator; why have them handled all over again by an inspector? The labor of handling is the important cost item, not the inspection or gaging. Sometimes it takes only a second to complete the inspection

TOLERANCE SPREAD	DESIRABLE RANGE	RANGE LIMIT	TOLERANCE CUT
.0002	.00004	.0001	.00004
.0005	.0001	.0002	.00009
.001	.0002	.0005	.00015
.0015	.0003	.0007	.0002
.002	.0004	.001	.0003
.0025	.0005	.0012	.0004
.003	.0006	.0015	.0005
.004	.0008	.002	.0005
.005	.001	.0025	.0005
.006	.0012	.003	.0007
.008	.0016	.004	.0008
.010	.002	.005	.0008

tion or gaging itself but ten seconds to pick the part up and put it down. To use work simplification terms, the make-ready and the put-away consume ten times the effort and time of the do.

Another fact unknown or unrecognized by much supervision is that 100 per cent inspection is practically never 100 per cent. If there are 100 known defectives in a batch of 5000 pieces, the ordinary inspector will miss 5, 10, 20 or more of them. At the very best, 100 per cent inspection is seldom more than 98 per cent efficient. Monotony, fatigue and ineptitude take their inevitable toll.

In one study made under particularly ideal conditions it was found that batches containing not more than 2 per cent defective could be screened to about 1/10 of 1 per cent, but as the work coming into inspection increased to 5, 8, 10 per cent or more defective, the substandard pieces slipping by inspectors increased to 2 per cent, even 5 per cent. The situation is like trying to brush white dog hairs off a blue serge suit.

One thing seems to come clear prac-



tically every time it is tried. Put the 100 per cent inspection or gaging operation in the operator's cycle when the process is such that an examination of every single piece is necessary. Retime the cycle, set up new standards, pay the operator the necessary fraction of a cent for inspecting, instruct him in the proper technique of inspection and gaging. It usually pays off. Evidence of the growth of this conception can be

seen in the increase in the design, construction and use of specially contrived indicating and electric gages into which an operator can flip each piece and get simultaneous, immediate size readings on multi-dimensional pieces.

There are of course occasional situations where it literally pays to add 100 per cent inspections or gaging—especially in the case of some high speed automatic machine or where selective

assembly for mating parts is absolutely essential—but usually source inspection is more economical.

With a background of inquiry and reasoning of the sort just described, the project of reducing and soon eliminating screw machine parts inspection was started.

In this department, an operator covered three machines but his already established standard time allowed adequately for the moderate specific changes in gaging and visual inspection procedures proposed. In fact, perhaps because the proposed routine proved to be more systematic, each operator

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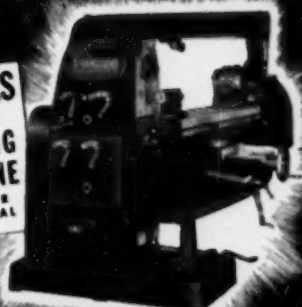
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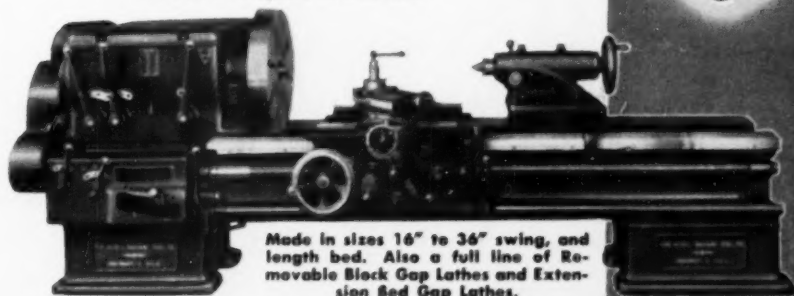
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gained a little time per cycle.

The armored fist appeared in only one place. Without the constant surveillance of an inspector visual defects like tool marks, surface finish, burrs, fillets, and cutoffs have a tendency to become unruly. Concrete limiting examples of these types of workmanship had to be selected for display to each operator. Time out was permitted for the formality of a "meeting" at which the limiting standards were displayed,

described, discussed and agreed on. Each operator took more than a superficial glance at the samples and these standards became the law as far as visual elements were concerned.

Naturally the particular concern was over dimensional control—how to avoid runs of oversize work and how to prevent undersize pieces or scrap. There was not a man in the group but who agreed work **could** be kept in tolerance, that digressions were frequently due to

inattention, laziness and sloppy adjustments and that if a machine was nagged enough, little or no out-of-tolerance work need appear. On the other hand, it was necessary, of course, from the point of view of production efficiency to get maximum runs from any one adjustment and the most number of pieces from a single tool sharpening. The trick seemed to be to have something ring the warning bell just in time to prevent outside work. Some such warning was all the more essential where tolerances were close.

For the warning bell an adap-

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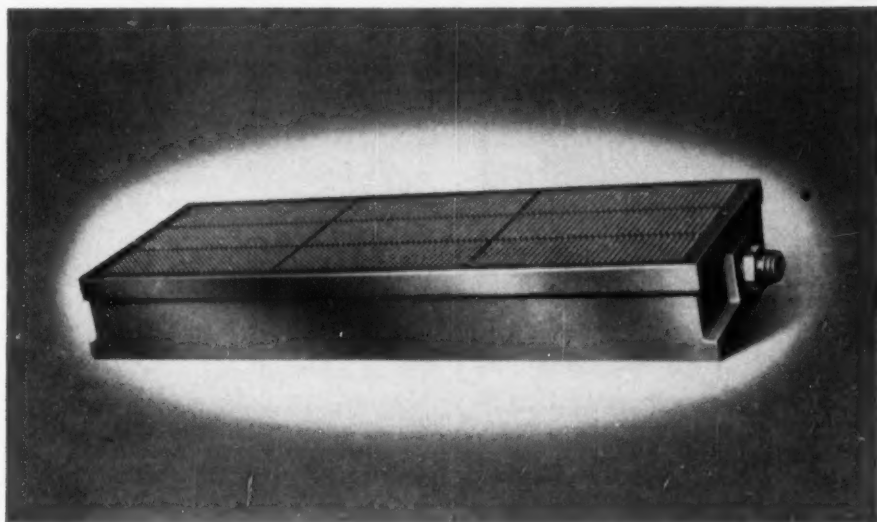


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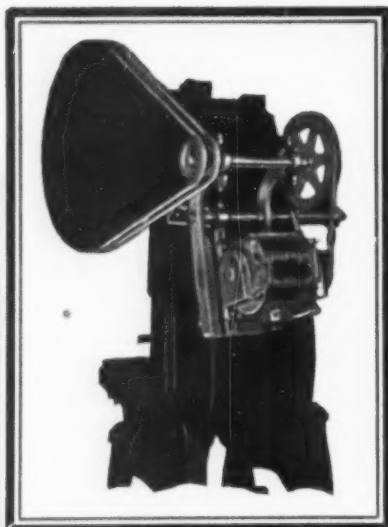
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tation of a quality control technique had been decided on and the next step was to give the operators practical pictures of that statistical quality control conception known as Range.

Where any certain dimension on a sample of parts taken consecutively from a machine is measured, it will be found, if the measurements are carefully made with a gage capable of reading "fine" enough, that one measurement will be the largest in the group and some other the smallest. The arithmetical difference—subtraction—is known as Range.\*

The idea of getting the Range of the variation of any particular dimension should be described more or less mechanically to the operator without mathematical or theoretical embellishments. It should be done on the basis of two or three pieces and he should learn to make the necessary subtraction readily mentally. All of which is not so difficult as it sounds on paper.

In the case at hand the operator took a sample of only two consecutive pieces from the machine. His measurements showed one piece or dimension inevitably larger than the other, if only by a tenth. The matter of subtraction to obtain the Range of the two piece sample was therefore easy.

Each operator was furnished with a blue printed table like that shown in the accompanying illustration. Having secured the Range, he checked the result with the table.

The table gives him, first, a list of

\* More complete descriptions of the Range technique appeared in *MODERN MACHINE SHOP* in the August and November 1949 issues and again in the January 1950 number. The idea of Range in Quality Control can also be readily studied by securing a copy of the Federal Products Corporation (Providence, R. I.) "Dimensional Quality Control Primer" or the book, "Quality Control Methods," C. W. Kennedy, Prentice-Hall, New York.





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Swing	Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

Write for Bulletin No. 6-22.

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the common tolerance spreads. "Tolerance spread" means the total tolerance for any dimension, i. e. the tolerance "spread" for  $\pm .002$  in. is .004 in. and for  $+.000 - .003$  in. the tolerance "spread" is .003 inch.

The next column in the table discloses the desirable or average Range for each tolerance spread. If the Range of the operator's two-piece sample is about the same figure as the desirable Range for that tolerance he has more than reasonable security that the natural machine variations are in line.

The table shows a Range Limit for each tolerance, and if the operator's measurements and mental calculations come up with a Range equal to or exceeding the limit, he shuts down to find out what is wrong with the machine or tool. **This even though neither of the pieces sampled may be beyond tolerance.**

The last column in the table covers tool wear and setting. The words Tolerance Cut mean the modification or reduction of the tolerance. Suppose the blue print allows  $\pm .001$  in. for instance, a tolerance spread of .002 inch. If in the two consecutive piece sample taken the operator finds either or both pieces larger than  $+.0007$  in. (or smaller than  $-.0007$  in.), it is the signal to shut down, resharpen and readjust. In other words, no single dimension observed can approach the tolerance closer than the "tolerance cut" listed in the table.

By faithfully observing the rules statistically established in the table no operator need let a machine produce out-of-tolerance work.

After a little practice with the new system no difficulty was experienced with the normal, standard, operating time cycle due to waiting for two con-



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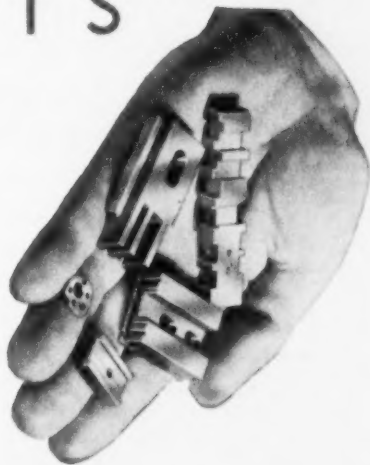
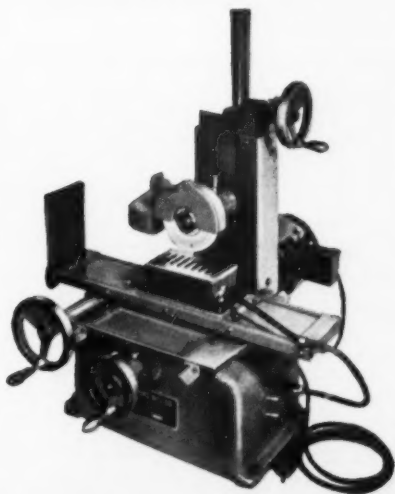
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secutive pieces to drop from the machine or due to taking measurements of the several dimensions and making the mental subtractions for Range.

The new system put the matter of conformance entirely up to the operator and, so long as he stayed within bounds for Range Limit and Tolerance Cut prescribed in the table, his work showed no more than an occasional flier out-of-tolerance if that.

One of the lessons to be learned

from the sort of undertaking just described is how much an operator can really be relied on when the conformance situation is put up to him in a business like, or shall we say scientific, fashion. Where an operator refuses to "play ball," ignores instructions or either deliberately or carelessly slacks, it probably spells a fundamental industrial relations situation anyway which, perhaps, should have been long since ironed out. Where what may be basic-

ally hoodlumism exists in a machine department, even the sleuthing and policing of the most rigorous inspection system can never prevent or screen out all defective work.

At first, the established routine patrol and batch inspection was maintained but within a few days the inspection was reduced to a sampling check of each half day's work passed in by the operator. After another week the work was checked only once a day, and a little later the screw machine work was checked only casually once or twice a week, on no stated schedule,

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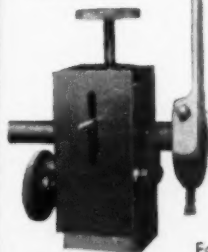
<p><b>A + B + C<sup>1</sup></b></p> <p>Open and close one pilot—no neutral.</p>	<p><b>A + B + 2C<sup>2</sup></b></p> <p>Open one pilot for R, other pilot for L—no neutral.</p>
<p><b>B + C No Neutral</b></p> <p>Solenoid energized for R or L—optional.</p>	<p><b>C + C With Neutral</b></p> <p>Energize one solenoid for R, other for L. Pressure or exhaust in neutral optional.</p>
<p>A = L3A Numatics Valve B = L3B Numatics Valve C = SL3 (L3A with solenoid pilot attached) C<sup>2</sup> = Two-way pilot valve C<sup>1</sup> = Three-way pilot valve</p>	<p>Shown here are a few typical combinations obtained with "Unitized Control" . . . applied directly to the air cylinder.</p> <p><b>INCREASE PRODUCTION —LOWER COSTS</b></p> <p>Send for Catalog</p>

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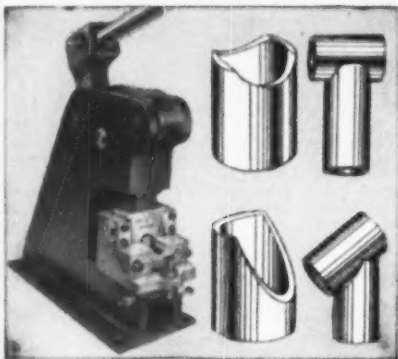


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more probably for psychological effect than anything else.

No attempt is being made here in the circumscribed space of a short article to explain the mathematical or statistical foundation for the figures appearing on the control table. They were based considerably on known and periodically checked machine capabilities. Some empirical modifications were made with—slight liberties or “poetical license” taken from—pure statistical Range and standard deviation calculations or estimates but, sufficient to say perhaps, they work.

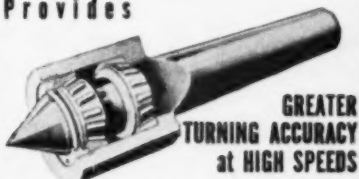
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Edmund Mottershead

# How Good Is Your Merit Rating System?

**Merit rating provides a factual basis for promotions and pay increases. Four factors in good merit rating. How you can evaluate your own merit rating system.**

By EDMUND MOTTERSHEAD  
President, Mottershead Associates

**I**T is always a good business policy for industrial management to periodically re-evaluate its personnel in terms of usefulness and effectiveness with an eye toward tightening up the weak spots in the organization. Every company has three types of employees: the top producers, the average-to-good producers, and the marginal workers who are the first to be laid off or discharged when cut-backs or similar circumstances arise. Obviously, it is cheaper to train and upgrade good workers into top producers and marginal workers into good workers than to undergo costly labor turnover.

Merit rating systems cannot accomplish miracles of increasing worker effectiveness directly, but they do provide a means of reviewing the personnel, determining which category the individual falls into, and a guide for management in selecting individuals to receive additional training.

In addition, merit rating provides a

sound factual basis for promotions and pay increases, and a merit rating system that is understood by all employees can exert a strong psychological influence on their productivity once it is generally known that the system is equitable and is administered consistently. Such a system may also be used as an effective check-up on a new worker at or near the end of his probationary period. It also serves as a factual basis for separation interviews, to show the dischargée just where and how his presence became undesirable.

There are four requirements that any merit rating system should fulfill in order to accomplish its objectives:

1. There should be a thorough job evaluation of every job in the organization to which the merit rating is applied. The fact of the matter is that modern techniques of job evaluation have been developed to the point that they are very successful in evaluating

all positions in an organization, even the high-salaried executive positions. Such job evaluation should include not only an analysis of the job content, job operations, and a general description, but also the "job price" or price-range, and performance standards set for various activities.

2. Job Qualifications and Performance Standards should be defined for each position which is to be rated. The qualifications should cover both the necessary technical knowledge and skill which the individual should possess, and such personal characteristics as neatness, honesty, alertness, and so on, which may have a direct bearing on his productivity and harmonious assimilation into the organization.

3. The Factors to be Rated should be selected carefully and sensibly. There is no point in rating a mechanic on

cleanliness or a stenographer on fallen arches. The list of factors should be kept as brief as possible, perhaps ten and not more than fifteen having been found by experience to be about the largest list any person doing the rating can handle intelligently and effectively.

4. Standards of Rating should be developed as precise and clear-cut as possible. The definition of such terms as "alertness" or "honesty" or "courtesy" is difficult, and great care must be exercised to make the definitions precise and to avoid overlapping between terms in the list. It is highly desirable that the terminology and the standards of rating be developed by joint conferences of all or nearly all persons who will do the rating so as to have as far as possible complete understanding of terms in order to obtain uniformity of ratings. Ratings of



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workers by supervisors should not be expressed in numerical scales or percentages, but rather by selecting a statement from a series of possible choices:

Another consideration in developing rating standards is the weighing of the factors. Suppose that ten factors have been selected, and in the opinion of management one or two are more im-

PERSONAL HEALTH:					
(Wrong Method).....	VERY BAD	POOR	FAIR	GOOD	EXCELLENT
(Wrong Method).....	0	2	4	7	10
(USE INSTEAD)					
PERSONAL HEALTH:					
(Right Method).....	Often absent	Often tired and late	Seems to be about normal	Quite active, vigorous	Abundant energy and vitality

By selecting from such statements as above that which applies to the person being rated, the executive using the rating sheet can understand exactly what the supervisor had in mind rather than wondering if Joe's rating of 7 isn't lower than Pete's rating of 9 in some other department.

portant than all the rest put together. What relative percentages should be assigned to these factors? Of course, the answer to that question is beyond the scope of this article. It can, however, be answered in the individual case by careful study of the situation, by consultation with the persons re-

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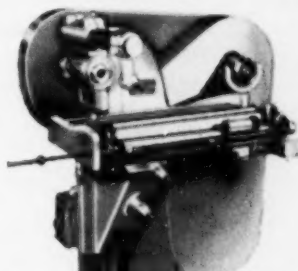
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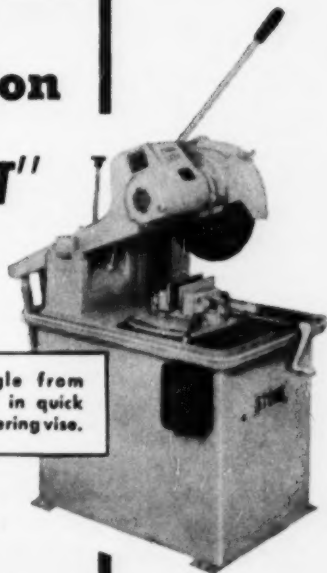
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sponsible for merit rating within an organization, and by arriving at a mutual agreement among all involved as to the relative importance of the factors.

One vital point in setting standards is to get the employees, or at least an employee committee, into the project at an early date, and have all standards worked out on a mutual basis with the workers having an equal voice with management. They will not only thus have no complaints, because they understand what is going on, but they will have a great deal of practical information to contribute to the setting of the standards. Even if the contribution of the workers were not so important as such, the effect on morale and upon the acceptance gained by the program makes it advisable to bring them into the picture.

Other problems involved in merit rating include the scope of the plan, who shall do the rating, and the participation by the supervisory organization.

Inasmuch as job evaluation can be accomplished for almost every position in any organization, there is no reason why merit rating cannot be similarly broad in scope. As a matter of fact, the effect on employee morale is generally very good if other members of the organization, including supervisors and executives, are subject to a similar form of merit rating. It breeds confidence when the whole organization is governed by a set of uniform, equitable principles.

The selection of the individuals to perform the rating is one common source of irritation and difficulty. The natural inclination is for the super-



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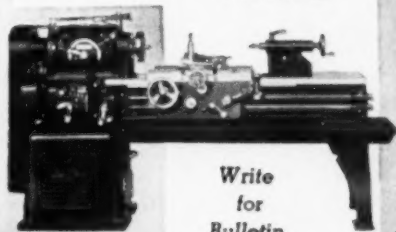
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Chart for Evaluating Your Merit Rating Program

SCOPE	None	Clerical jobs only	Production and clerical jobs	Hourly jobs only	Promotion, clerical, hourly, and executive jobs
EMPLOYEE PARTICIPATION	None	Helped prepare job descriptions	Approved job specifications	Sat in on conferences	Equal voice with management
SUPERVISOR PARTICIPATION	None	Helped prepare basic information	Approved details of program	Were called into conferences	Active members of committee
WHO RATES WORKERS?	No one	Personnel Department	Department head	Department head and assistant	Dept. head, assistant, and personnel dept.
WHO RATES SUPERVISORS?	No one	Personnel Department	Superintendent	Superintendent and Personnel Dept.	Superintendent, personnel dept., and top management
HOW LONG IN ACTION?	None	Started but not put in action	Less than a year	One to three years	More than 2 years
JOB EVALUATION USED?	None	Classification by title	Standard point system	Custom-built point system	Characteristic comparison system
FACTORS RATED	None	Job skills in performance	Personnel characteristics	Skills and personality	Skills & personality weighed to fit circumstances
STANDARDS OF RATING	None	Numerical scale	Percentages	Multiple-choice answers	Multiple-choice, weighed & keyed
ACCEPTANCE	Employees opposed	Employees in doubt	Indifferent	Employees accept it	Employees enthusiastic

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visors to rate everyone under their control. This arrangement works out all right if the other supervisors rate their people by similar standards and if the department head is not given to showing favoritism. It is usually good policy to have group leaders, assistant supervisors, as well as some representative of the personnel department rate the worker where possible, so that there are two or three ratings of each

individual. This sounds like a lot of paper work, but in practice it takes very little time to rate a worker on ten or fifteen characteristics on a mimeographed or printed form when the ratings have been set up in simple terms as described above. The personnel department should minimize the clerical job by having forms ready with workers' names and other basic information already typed in before they are distributed to the supervisors.

When it comes to rating supervisors and junior executives, the selection of the person to do the rating becomes even more difficult. Some organizations get around this with a committee; others use a round-robin system. It is more necessary than ever at the upper levels for several ratings to be made of a single individual.

Supervisory participation in the establishment and operation of the system is essential. These men have much to contribute to the program in its initial stages, and should feel that it is in

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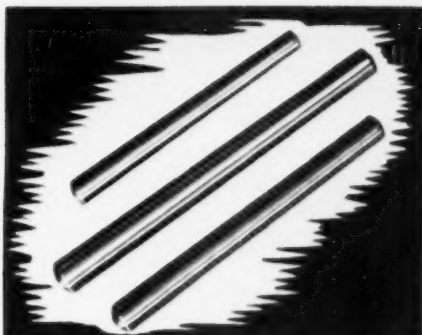
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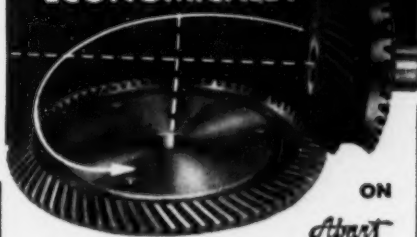
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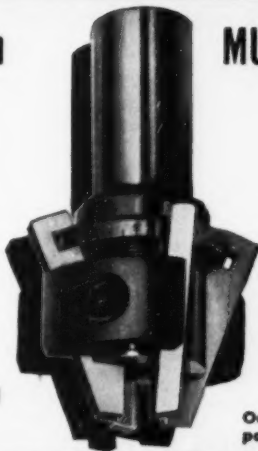
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large part their own "baby" in order to insure their maintaining it at peak effectiveness.

On page 214 is a chart on which you can rate your own organization's merit-rating system. Place a check mark in the box containing the situation most nearly corresponding to your own and connect the marks with a heavy line to obtain your organization's merit-rating profile.

### First Iron Works in U. S. to be Restored

**R**ESTORATION of one of the earliest industrial landmarks in America, the first iron works and blast furnace to be operated in the New World, is under way at Saugus, Massachusetts. It is expected to be completed and opened to the public late in 1951, it is reported in *Steelways*, magazine of American Iron and Steel Institute.

The iron works, which dates from 1644, is being restored as a permanent tribute to the iron workers of colonial days and to their successors, who have increased daily production of the 1640's, one ton of bar iron, to an industry producing over a quarter million tons of steel per day.

Following clues based on fragmentary records, an archeological crew already has brought to the surface more than two tons of relics of the iron works. They include iron rings, nails, tools, kitchen utensils and many other objects.

This ancient site might have remained obscure except for the loyalty of Miss M. Louise Hawkes of Saugus, whose ancestors lived there as far back as 1630.

In 1942, graduates of the Ford Trade School bought an old house, formerly the property of a long-dead Saugus ironmaster, with a view of moving it to Michigan as a gift to the late Henry Ford.

Miss Hawkes knew the story of the iron works and believed that what belonged to New England should remain there. With the cooperation of Governor Saltonstall and Henry Ford himself, the structure was permitted to remain in New England.



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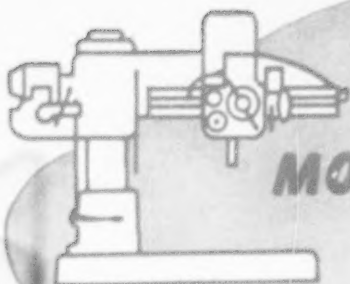
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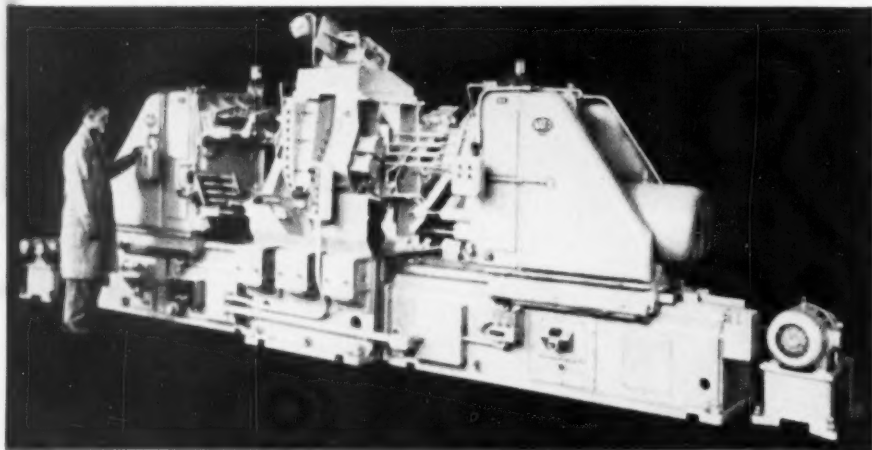
### Automotive Piston Pins Machined with Automatic Multi-Driller

**T**HE automatic hopper feed multi-driller shown herewith has been manufactured by the National Automatic Tool Company, for use by a large automobile manufacturer in the machining of piston pins. The machine has a central fixture with heads sliding on bed ways from opposite sides. Operations are performed automatically, with hopper feed and

automatic loading, clamping, and ejection of the work.

The machine is push-button controlled and operates through automatic cycles to drill, chamfer, ream, and finish ream 575 piston pins per hour. A chip conveyor attached to the rear of the central work fixture runs in under the fixture and carries chips out of the machine.

The operating sequence of the machine is as follows; Position No. 1—machine loads four parts; Position No. 2—right and left-hand heads drill for



Automatic hopper feed multi-driller tooled for machining automotive piston pins

0.625-inch diameter 1/5 through; Position No. 3—right and left-hand heads drill for 0.652-inch diameter 2/5 through the chamfer inside diameter; Position No. 4—right-hand head drills for 0.652-inch diameter across center while left-hand head idles; Position No. 5—right-hand head rough reams through using accelerated spindles while left-hand head idles; Position No. 6—right-hand head idles while left-hand head reams through to 0.652/0.657-inch diameter using accelerated spindles; Position No. 7—unload four parts.

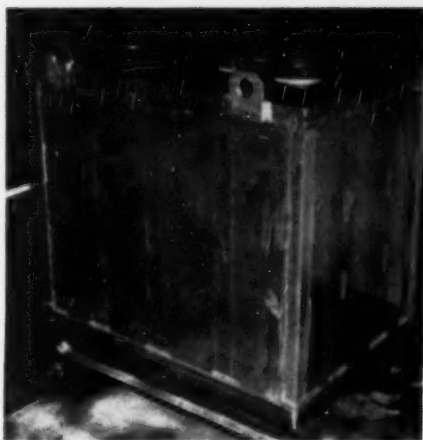


Fig. 1—This illustration shows a view of a completed welded aluminum tank.

## Welding Process Applied to Fabrication of Aluminum Tanks

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duced a unique welding process known as "Aircomatic." Characterized by an inert gas-shielded arc between the workpiece and a consumable elec-



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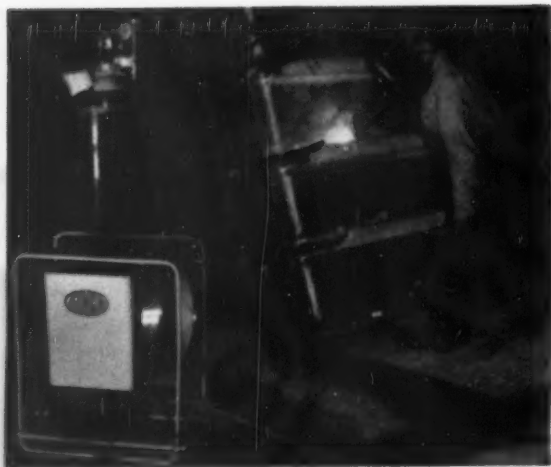


Fig. 2—Reinforcing angles are welded to tank side plate using gas-shielded metal arc process.

For lightness, ease of cleaning, and corrosion resistance, the tanks, which are approximately 5 x 3 x 5 feet in size, are fabricated entirely of 61S-T6 aluminum. The top, sides, and bottom of each tank are  $\frac{3}{8}$  inch thick, with the reinforcing channels, skids, and lifting eyes in proportion. The overall weight is 1,000 pounds.

trode through which metal is transferred to the workpiece where it becomes part of the joint, the process is now finding wide application in those fields where heavy sections of aluminum and aluminum alloys are welded. It is also now being commercially used on stainless, silicon bronze and clad steels and shows excellent promise of being applied to many other metals as well.

One of the most successful applications of the process came about because the builder of a number of tanks of the type shown in Fig. 1 was disturbed to find that welding time using his present method of welding was averaging around 280 man-hours per tank. Use of the gas-shielded metal arc process provided some very interesting economies.

Initial fabrication starts with the preparation of sub-assemblies of which a side is shown in Fig. 2. The side plate is clamped to a table and the reinforcing angles are clamped on the plate. No tacking is required, and the finish welding is begun as soon as the assembly is positioned. The operator starts in the center and welds to the left edge and then moves to the right edge and welds to the center. The  $\frac{5}{16}$ -inch fillet weld, 45½ inches long, is made in 2½ minutes.

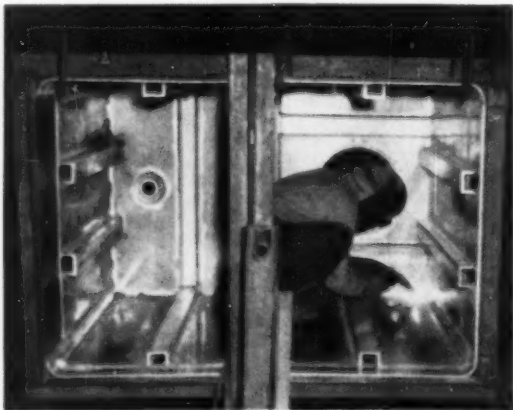


Fig. 3—A jig of the type shown herewith is used in holding tank sub-assemblies together during welding.



Fig. 4—Side butts are completed before welding on tank top.

As soon as this weld is completed, the welding table is placed in a horizontal position, and the fillet weld for the other side of the channel is made by the same procedure and at the same speed. To make the foregoing welds,  $\frac{1}{16}$ -inch 43S filler wire is used. Wire

feed is 208 inches per minute, current is 210 amperes, and the shielding gas is high purity helium which is consumed at a rate of 45 cubic feet per hour.

After completion of the sub-assemblies, all parts are assembled in a jig, as shown in Fig. 3, and completely welded prior to putting on the bottom. The side butts are completed before welding on the top, as shown in Fig. 4. In this connection it is interesting to note that the jig is not positioned, whereas this was necessary when using the previous welding method.

Next, the bottom is tacked on and welded completely inside and out with the tank in its normal position. A suction blower is used to ensure the operator adequate fresh air.

An interesting detail is the lifting lug shown in Fig. 5. This lug is 6 x 7 x  $\frac{3}{4}$  inch thick. The fillets and butts con-

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necting it to the rest of the structure range from  $\frac{3}{4}$  to  $1\frac{1}{4}$  inches and are easily made in a reasonable length of time with the inert gas-shielded metal arc process.

The overall welding time per tank was reduced from 280 hours to 48 hours of which about 8 hours were for cleaning-up welding by manual tungsten arc welding. For this operation, the operator uses about 225 amperes

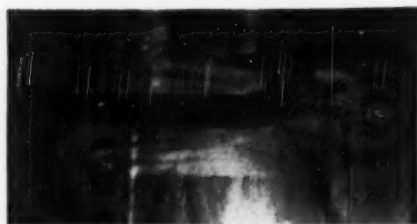


Fig. 5—Lifting lug is butt and fillet-welded to tank.

of a.c., a  $\frac{3}{16}$ -inch tungsten electrode, and an inert shielding gas. This combination of the two processes has resulted in low overall tank cost.

### Scored Machine Tool Ways Repaired by New Welding Technique

**S**CORED or gouged ways on large lathes, milling machines, shapers, and planers are now being repaired by a new welding technique developed by the Eutectic Welding Alloys Corporation. The method involves the use of a welding rod which actually bonds at 354 deg. F. (nearly 2,000 deg. F. below the melting point of cast iron), thus making the method applicable to precision equipment without danger of the formation of damaging oxides, warpage, distortion, or the appearance of inner stresses in

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both ferrous and non-ferrous metals.

The rod used does not fuse with the base metal; however, due to its combination of metals which has strong affinity for cast iron, strong bonds can be obtained at extremely low temperatures. For repairing ways that are scored, pitted, or porous, the technique of using this rod with an oxyacetylene torch is quite simple. All dirt is first cleaned out of the scored area, and the welding torch is adjusted to a slight acetylene excess. The flame is then applied an inch away from the weld area, and the flame cone is kept from 1 to 3 inches away from the base metal.

Next, a temperature-indicating flux specially prepared for use with the rod is applied to the weld area by heating the end of the rod and dipping it into the flux, then melting the flux from the end of the rod on to the weld area. Flame is applied around the weld area until the flux liquifies, providing an automatic indication that the correct bonding temperature has been attained. At this point, the end of the rod is rubbed onto the weld area, and heating is continued until a thin layer of

the rod "tins" the entire surface for build-up. The torch is then used directly on the tip of the rod to melt additional metal onto the tinned surface. When the build-up is complete, the way is allowed to cool, excess flux is removed, and the deposit is scraped and polished.

A single aircraft plant estimated that it has salvaged over \$50,000 worth of machine tools by repairing scored surfaces using the technique.

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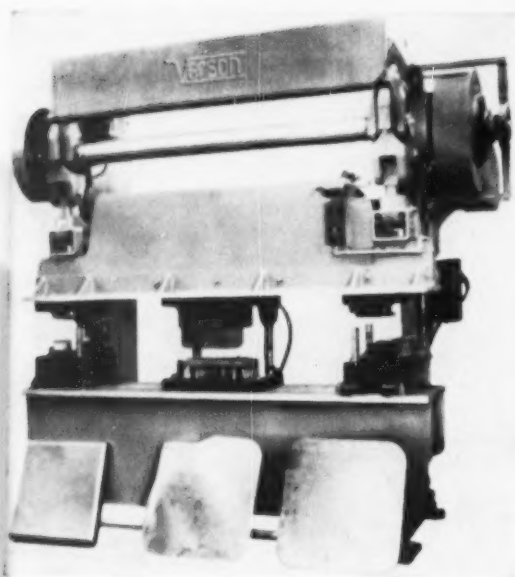


Fig. 1—Standard intermediate press brake equipped with dies for performing first three operations in producing ball corners on panel

## Ball Corner Panels Formed on Standard Press Brakes

**U**SING a tool-up developed by the Verson Allsteel Press Company, ball corners are now being economically formed on panels in standard press brakes with minimum spoilage, elimination of corner welding and finishing, and a small amount of work handling.

Starting with a square sheared blank, four operations are required in forming ball corners thereon. The first

operation consists of trimming the developed corners of the blank in four strokes of the press. The second operation provides for drawing of the corners in four press strokes. In the third operation, surplus material is cam trimmed from the corners in four strokes. These first three operations are performed on a single intermediate press brake equipped with three sets of dies, as shown in Fig. 1.

The fourth operation, restriking the side flanges, which also requires four strokes, is performed on a second press brake equipped with a sectional restrike die, as shown in Fig. 2. This die consists of a set of master ends which can be expanded any desired distance by placing filler blocks between the ends to permit restriking any length of work within the capacity of the brake.

Thus, with the tool-up described above, a ball corner panel is completed in only two handlings without the use of any special machinery. The tool-up

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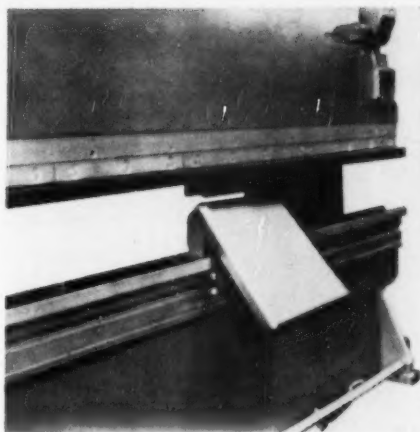


Fig. 2—Close-up view of standard intermediate press brake equipped with restrike die for forming side flanges of ball corner panel

is claimed to be easily and economically adaptable to a wide variety of work sizes.

## Automotive Water Pump Bodies Machined at High Speed Rate with Special Drum Type Machine

**I**N the plant of a prominent automotive manufacturer, 22 operations are now being performed on a water pump body using a special high production drum type machine developed by the Barnes Drill Company. The machine incorporates two opposed hydraulic units with special heads and a 17-station 27-inch indexing drum. One head is arranged with 25 spindles and the other with 5 spindles. The unit with the 25-spindle head is powered by a 25 h.p. driving motor and 3 h.p. hydraulic motor. The unit with the 5-spindle head is powered by a 15 h.p. driving motor and 2 h.p. hydraulic motor.

The operations performed on the

## fabricated to your specifications

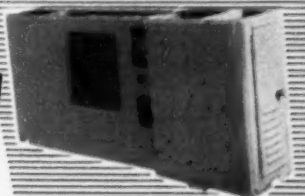
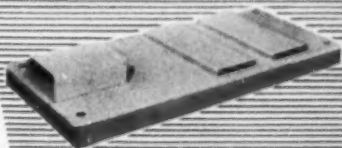
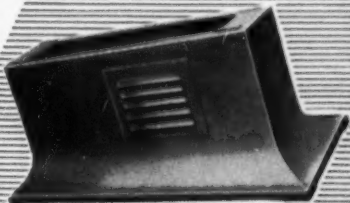
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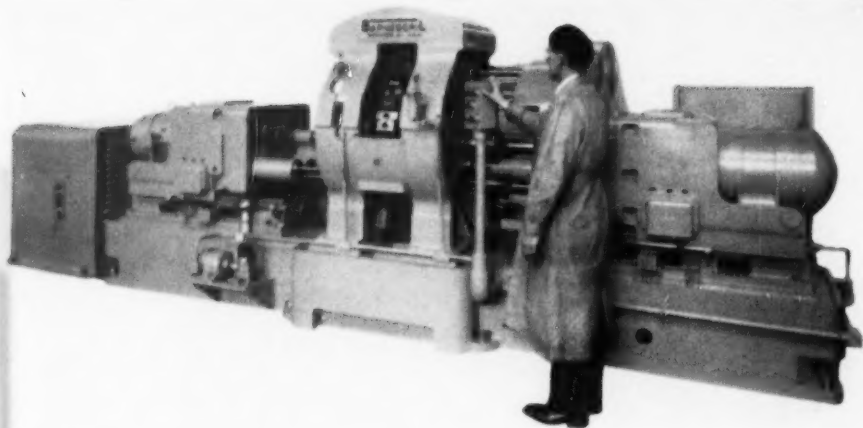


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# MACHINE BASES



View of special drum type machine used by automotive manufacturer for machining water pump bodies

water pump bodies with the machine consist of drilling, reaming, facing, boring, chamfering, and hollow milling. In one operating cycle, 12 holes and four surfaces are machined, with work handling reduced to a minimum. The production rate of the machine is said to exceed 90 pieces per hour at 80 per cent efficiency. The controls are carefully interlocked to provide for maximum safety, even to the point of the fixture locking wrench which must be in position in the holder before the machine will operate.

## High Speed Press for Drawing Automotive Door Panels

**F**IGURE 1 herewith shows a mechanical double-action press completed by Clearing Machine Corporation for installation in the plant of a Detroit manufacturer where it will be used for the high speed drawing of automotive inner door panels. Before shipment, the machine was placed in operation at the Clearing plant in Chicago, forming automotive inner door panels complete in five seconds per piece. When the press is put in service by its new owner, it



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will be equipped with an automatic feed and unloader so that it can be used to produce panels continuously at the five-seconds-per-piece rate mentioned above.

The press features a linkage arrangement which controls movement of the outer and inner slides and is

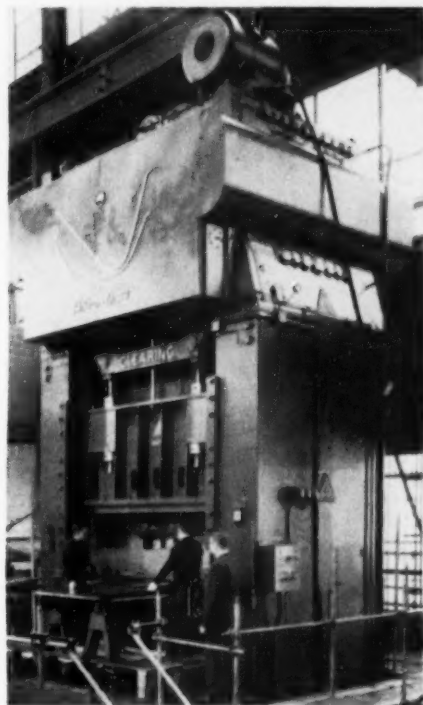


Fig. 1—High speed press for drawing automotive inner door panels

designed to permit a maximum number of strokes per minute without tearing the sheet. The press is arranged to regularly operate at twelve strokes per minute and has a total capacity of 750 tons, of which 450 is on the inner, or forming, slide. The press measures 108 inches between housings and will draw and lift out a maximum of 14

## The First MAJOR Holder IMPROVEMENT In 25 Years GLOBE BORING BAR HOLDER

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### COMPLETE SETS (With three bars)

Set No.	Diameter Bar Inches	Tool Bit Inches Square	For Lathes Swing Approx.	Price Complete
0.AA	$\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$	$\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$	8" to 12"	\$ 16.40
1.A	$\frac{1}{2}$ $\frac{3}{4}$ 1 $\frac{1}{8}$	$\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$	12" to 16"	26.35
2.A	$\frac{1}{2}$ 1 $\frac{1}{8}$ 1 $\frac{1}{4}$	$\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$	16" to 18"	35.15
3.A	$\frac{3}{4}$ 1 $\frac{1}{8}$ 1 $\frac{1}{4}$ 1 $\frac{1}{2}$	$\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$	20" to 22"	61.55
4.A	1 $\frac{1}{8}$ 1 $\frac{1}{4}$ 1 $\frac{3}{8}$ 1 $\frac{1}{2}$	$\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$	24" to 36"	87.95
6.A	1 $\frac{1}{2}$ 1 $\frac{3}{4}$ 2 $\frac{1}{2}$ 2 $\frac{3}{4}$ 3	$\frac{1}{2}$ $\frac{3}{4}$ 1	24" to 36"	193.50

\*  $\frac{1}{8}$ " diameter bar included in set is solid tool steel.

### GLOBE BORING BARS (Calibrated)

Bar No.	Dia.	Length	Tool Bit	Price
162A	$\frac{3}{8}$ "	7"	$\frac{1}{8}$ "	\$3.50
122A	$\frac{1}{2}$ "	8"	$\frac{1}{8}$ "	3.50
123A	$\frac{3}{8}$ "	9"	$\frac{1}{8}$ "	3.50
124A	$\frac{3}{8}$ "	10"	$\frac{1}{8}$ "	3.50
125A	$\frac{3}{8}$ "	11"	$\frac{1}{8}$ "	4.35
126A	1"	13"	$\frac{1}{8}$ "	6.30
127A	1"	14"	$\frac{1}{8}$ "	6.30
128A	1 $\frac{1}{8}$ "	16"	$\frac{3}{8}$ "	8.75
129A	1 $\frac{1}{8}$ "	18"	$\frac{3}{8}$ "	12.30
130A	1 $\frac{1}{2}$ "	23"	$\frac{1}{2}$ "	16.30
176A	1 $\frac{7}{8}$ "	30"	$\frac{3}{8}$ "	36.35
155A	2 $\frac{1}{2}$ "	36"	$\frac{3}{8}$ "	72.70

Permanently graduated in  $\frac{1}{4}$ " calibrations indicating depth of bore. Eliminates necessity for file and chalk marks.

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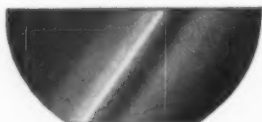
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inches. The blankholder stroke is 22 inches. The press is driven by one 75 h.p. motor operating through a single clutch and brake unit, and is equipped with a portable push-button control so that one-man operation of the machine will be both safe and practical.

In the test run at the Clearing plant, the automatic feed was not installed

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Fig. 2—Close-up view of press showing device used for unloading completed door panels

on the press; however, an iron hand unloader, as shown in Fig. 2, was in operation on the press.

## Redesigned Die Increases Rack Production

THE die shown herewith is currently being used on a double crank press to punch straw racks for combines from 20 and 24 gauge galvanized steel. The normal yearly production with this equipment is approximately 50,000 racks.



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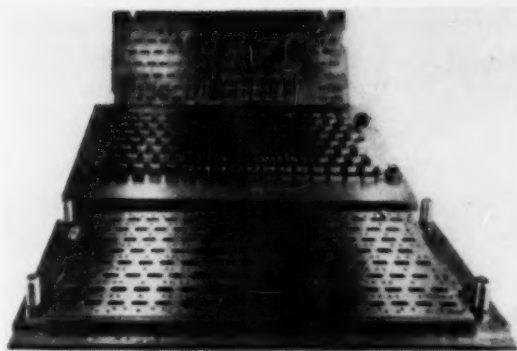
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View of redesigned long-wearing die for punching straw racks, showing multiple eight-row punches



An interesting problem was involved in making the die, which is a product of the Phinney Tool & Die Co., Inc., Medina, N. Y. Originally, the die was designed to pierce only 4 holes at a time, locate for another punch, and then pierce 4 more holes—even-  
tually reversing and requiring 8 to 9 hours to produce 100 pieces.

The design of the die was later changed to permit the punching of one complete row of holes at a time, thus increasing production to 100 pieces in approximately 2½ hours. Still not satisfied with what appeared to be "better than average" production, the company again changed the

design of the die, this time starting from scratch and changing the die steel to Carpenter No. 484, selected for its long-wearing properties. The resulting die, as shown herewith, is capable of piercing 8 rows of holes at a time (which involves 133 holes, 3¼ x 2½ inches, and 12 holes, ¾ x 1 inch), providing for a production of 100 racks in only one hour and a sav-

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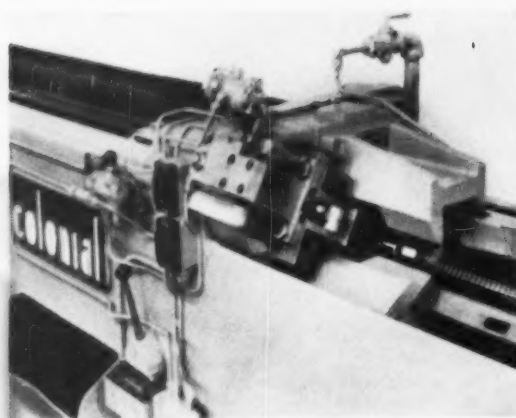


Fig. 1—Colonial universal horizontal broaching machine equipped with shuttling fixture for triple-slotting clutch hubs of the type shown in Fig. 2

## Deep Slots Broached in Clutch Hubs with Automatic Fixture

**T**HE Colonial universal horizontal broaching machine shown in Fig. 1 is equipped with shuttling fixture for use in the simultaneous broaching of three  $\frac{3}{4}$  x 2

25/32 x  $\frac{1}{8}$ -inch equally spaced slots in transmission synchronizer clutch hubs of the type shown in Fig. 2. Except for actual loading and unloading of parts, the operating cycle of the machine is completely automatic.

After a part is placed in the shuttling fixture, the "start" button of the

ings of 8 cents per rack. At a production of 50,000 racks per year, the plant using the redesigned die saves approximately \$4,000. Moreover, where it was necessary to regrind the old die every two days, the redesigned longer-wearing die has to be ground only once a week.

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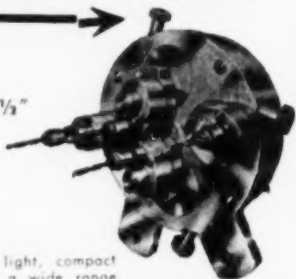
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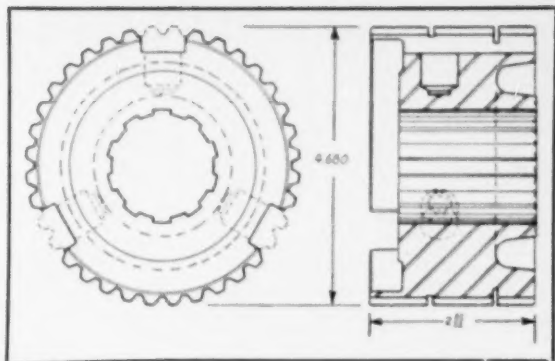


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Here's a light, compact tool with a wide range of adjustment. Can drill on squares, rectangles, circles, triangles and irregular patterns. Head is fully geared. Grooved ball thrust bearings on all spindles. Needle bearings wherever possible. Simple locking arrangements. All moving parts hardened. Heads made with 3, 4 and 6 spindles. Write for Complete Information

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Fig. 2—Drawing of triple-slot transmission synchronizer clutch hub



machine is pressed and the following sequence of operations takes place; (1) the fixture clamps the part and shuttles into cutting position; (2) the broaches operate through their cutting strokes; (3) the fixture shuttles back to unloading position and unclamps the work; (4) the broaches return to cutting position while the operator unloads and reloads the fixture. A follow-rest is provided for the top broach, while the lower broaches are also supported through their entire travel.

The broaching machine is a 15-ton 72-inch stroke type manufactured and tooling by Colonial Broach Company.

### Planetary Gear Cages Machined in New Special Machine

**A** NEW automatic cycle special machine tool for machining planetary gear cages which may be operated by one man has been specifically designed and built by The Cross Company for a large



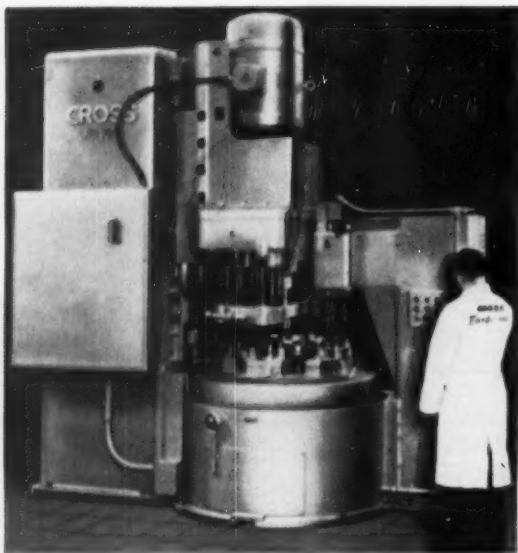
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View of special machine used by large automotive manufacturer for machining planetary gear cages.

and power clamping is provided for the work-holding fixtures. The index table of the machine is a six-station, fluid drive type. The steel ways are hardened and ground; and the feed and rapid traverse mechanisms of the table are hydraulically operated. Flexibility for part design changes is provided through the use of standard Cross units.

automotive manufacturer. With the new equipment operating at maximum efficiency, 75 parts per hour may be drilled, tapped, reamed, and counterbored. A view of the machine may be seen in the accompanying illustration.

Output at a high rate of efficiency is assured because operations of the machine are used to set the pace for the operator who loads and unloads while the machine is cutting. Multiple operations on opposite sides of a part are handled simultaneously at each station by means of double loading,

### Flow Type Air Gage Provides Accurate Check of Honed Motorcycle Bearings

**T**HE accompanying illustration shows a Micromatic honing machine which has been installed in the plant of the Harley-Davidson Motor Co., Milwaukee 1, Wis., for honing the inside diameter of motorcycle connecting rod bearings. The operator is shown checking the accuracy of a honed bearing using a Sheffield Precisionaire flow type air gauge which is designed to instantly check parts



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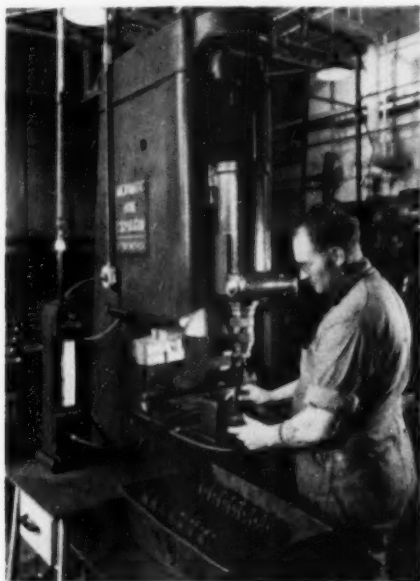
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to an accuracy of 1/10,000 inch and is operated from the regular compressed air supply of the plant.

To eliminate error and scrap, Harley-Davidson is now using eight Sheffield Precisionaires for 14 quality control applications, such as checking bearing races and transmission gears, bores of cylinders and piston wrist



Honed motorcycle connecting rod bearing is checked for accuracy with flow type air gage.

pins, and mainshaft bearing races in crankcases. The instruments are products of The Sheffield Corporation.

## Cast Iron and Chrome Nickel Steel Cut in Record Time

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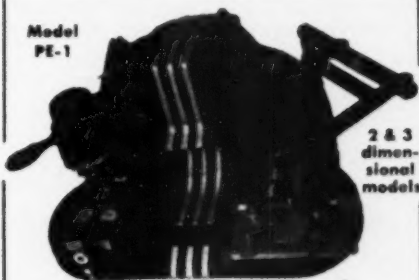


Oxyarc process used to cut 5 in. thick cast iron cylinder

operator using the Oxyarc holder to cut the cylinder, and the finished cut is shown in the insert.

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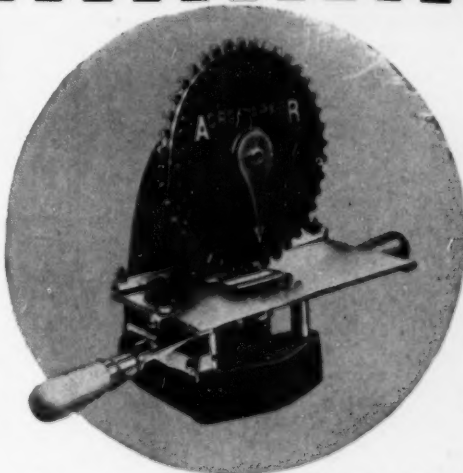
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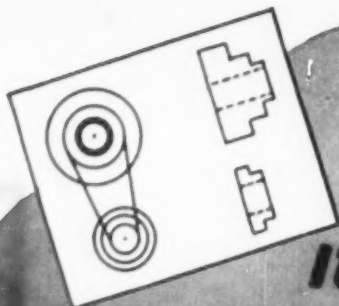


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## IDEAS FROM READERS

### Spinning Machine Devised for Relining Diesel Bearings

By W. J. GRANBERG

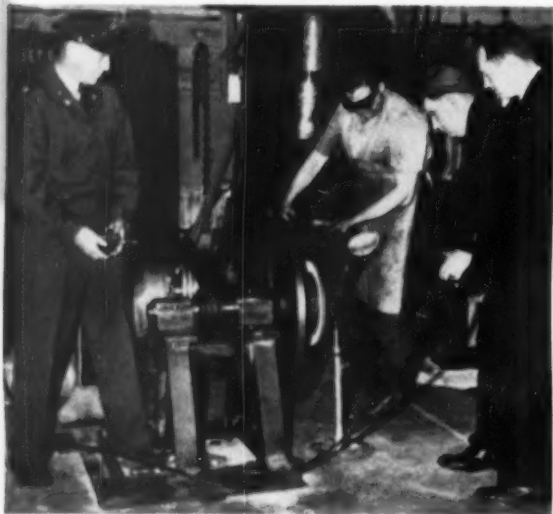
**A** DEVICE for relining Diesel engine bearings by spinning developed at the Seattle Port of Embarkation is providing for a considerable saving in time and money over the previous method of fixed pouring. Port engineers estimate that \$57 are saved on each bearing relined by the use of the new machine, which accounts for

an appreciable saving on the approximately 120 bearings relined in one year.

Designed and built by Harold Webb, the Port's superintending engineer, the machine may be used for relining other types of bearings, such as crank pin bearings. The cost of the device was about \$1,000. Aside from the financial saving, experience has shown that the bearings poured under the spinning method are of higher quality and more durable, being packed more tightly and evenly, with all air bubbles eliminated.

In addition, dross and poorer metal settle on the surface of the bearing and are removed when machining operations are performed, leaving a virtually perfect bearing surface.

Utilizing centrifugal force, the machine employs a three horsepower electric motor to turn a circular steel adapter plate which carries a pot



▲  
Molten babbitt is shown being poured into a Diesel engine bearing which is spun at a speed of approximately 600 r.p.m. by a machine recently devised in the machine shop of a Seattle Port of Embarkation.

chuck, or adapter fixture, to which the bearing halves are clamped. The halves are bolted against an asbestos ring which sets in a groove in the adapter. Between the two halves there is a thin strip of asbestos which is removed later to permit entry of a hack saw blade for cutting through the babbitt to free the halves.

Between the ends of the bearing halves and the faceplate which holds it to the adapter fixture is a thin sheet of asbestos to prevent babbitt leaks. The molten babbitt is poured into the spinning bearing from a small trough through a large hole in the asbestos sheet and the faceplate. The trough is preheated with a torch to prevent cooling of the babbitt. The electric motor is designed to spin the device at variable speeds up to 1,200 r.p.m., although the general practice is to operate the device at a speed of about 600 revolutions per minute.

In contrast to the previous method

of fixed pouring, the amount of babbitt required is carefully calculated in advance so that no more than needed is poured. This means that about one-sixteenth more than is required to meet specifications is poured in order to allow for machining which is performed in the conventional manner for smoothing and to remove excess metal.

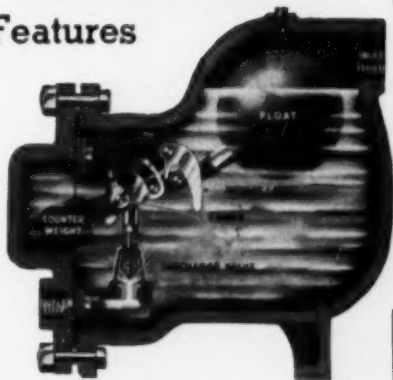
## Shave Stock Breaker and Spreader

By CLIFF BOSSMANN

**F**REQUENTLY, when using a shaving die, the stock which is shaved off must be broken into two sections so that it can be more easily removed from the punch. After the stock has been broken, it must be uniformly forced away from the punch outline to eliminate a stock jam. Units for ef-

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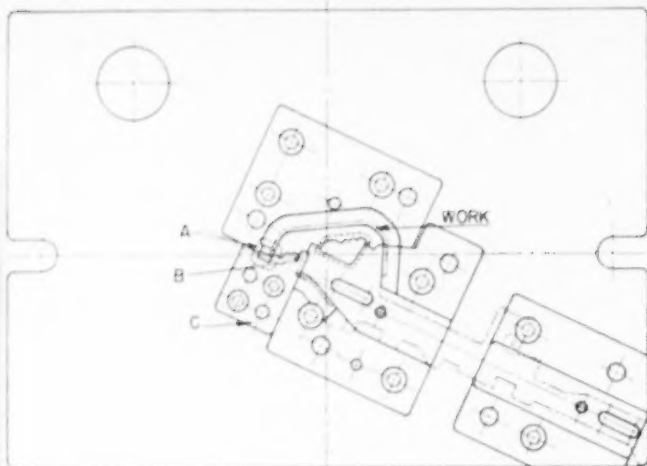


Fig. 1 — Drawing showing use of stock breaker and spreader in shaving die

fecting the desired stock breaking and spreading operations are shown in Fig. 1.

The stock to be shaved off is indi-

cated as a double line at the left end of the part, which is shown in phantom. After several shaves have been made, the shaving stock finally reaches the stock breaker, A, where it is broken into two sections. The portion of the punch outline indicated as B has no chamfer since the punch has been machined straight through, leaving no flange or chamfering effect. Therefore,

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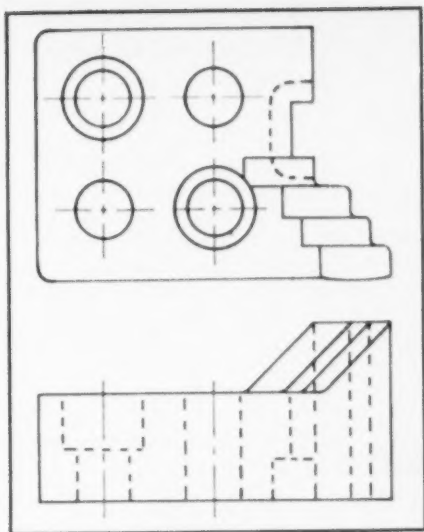
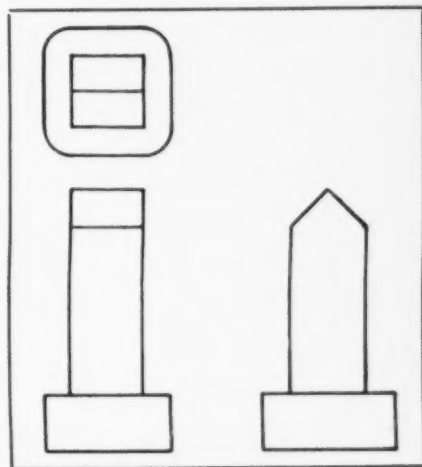


Fig. 2—Detailed sketch of shave stock spreader

in order to maintain uniform spreading around the entire left end of the punch, a stock spreader, C, is inserted along this unflanged portion of the punch.

Fig. 3—Detailed sketch of shave stock breaker



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Fig. 2, which is a detailed sketch of the stock spreader, shows the chamfered right end that spreads the stock after the shaved-off stock has been broken into two lengths. Fig. 3 is a detailed sketch of the stock breaker and shows the upper sharp corner which breaks the shaved-off stock into two pieces. The punch used in the shaving die is made in two sections to provide for ease of grinding.

## Method for Scribing Opposed Lines on Shafts

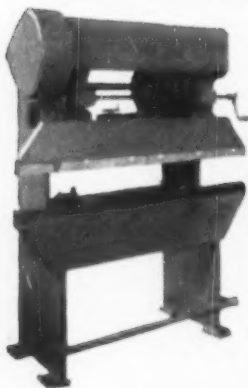
By JOHN E. HYLER

**M**ANY mechanics are stymied when it comes to developing a suitable method for scribing opposed lines on a shaft. One method which is quite convenient involves the use of a surface plate and two V-blocks. The shaft is held in the two V-blocks on top of the surface plate, and the scriber of a sur-

face gage is set in such a manner that it will scribe at a convenient height along the side of the shaft. One line is then scribed preliminarily.

With one line already scribed in this manner, it is evident that if the shaft can be turned precisely 180 degrees in the V-blocks the scriber of the surface gage can be used at the same setting to scribe a second line that is positively opposite. Take a square and, holding it in contact with the surface plate while the blade of the square passes across the end of the shaft, scribe a vertical line across the end of the shaft. Now turn the shaft in the V-blocks until what was the top of the line across

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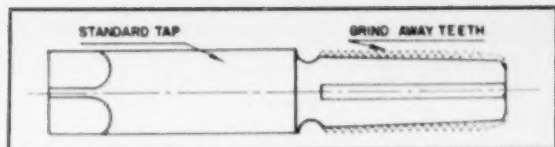
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Sketch shows method of converting a standard tap to a special reamer.



the end is now the bottom and the line is again in absolute registration with the blade of the square. This means the shaft has been turned through precisely 180 degrees and that the second line can now be scribed along the side of the shaft with the scriber of the surface gage accurately opposite to the first line.

## Special Reamers Made from Salvaged Taps

By STANLEY R. WELLING

**T**HE writer has found it possible and quite economical to make special reamers from used taps which have been salvaged. In making one of

these special reamers, a tap of sufficient diameter is first set up in a cylindrical grinder, and the threading portion is ground down to the diameter or taper required. Care must be taken to grind away the full depth of all threading teeth, as shown in the accompanying illustration. After the tap is ground to the desired reamer size, the flutes of the tool are backed off on a cutter grinder.

Taps are made from high speed steel, and they are therefore ideal for reamers. By making special reamers from salvaged taps, the necessity and expense of grinding down standard reamers, or ordering and waiting for the arrival of the special reamers is eliminated.

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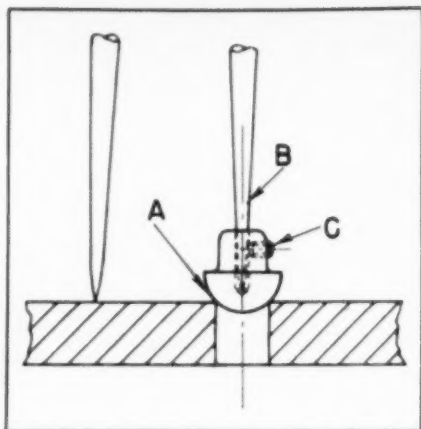
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## Button Attachment for Dividers Permits Circles to Be Scribed

By ROGER ISETTS

THE accompanying illustration shows a simple attachment for standard dividers which will permit circles to be scribed on surfaces using drilled holes as centers. As may be seen, a tool steel button is turned to a



Sketch showing modified button attachment for dividers

spherical radius on one end, as shown at A, and a hole is drilled through the center of the other end to accommodate one of the legs of the dividers, B. A smaller hole, in which a set screw, C, is placed, is then drilled and tapped perpendicular to this center hole.

In use, the modified button is simply slipped onto a divider leg, and the set screw is tightened. The spherical portion is placed in a previously drilled hole, and a circle of the desired radius is scribed with the free leg of the dividers. The button attachment is simple to make; and, as needed, it may be slipped onto or removed from the dividers quite easily.

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## Method of Locating Screws in Inaccessible Spots

By F. E. RILEY

**I**N the assembly of many different types of products, it is often necessary to locate screws in inaccessible spots such as at the bottom of deep and narrow recesses, in awkward overhead positions, and close to internal corners. The jobs of locating such screws are not only tedious and unpleasant; but, in addition, the time required to perform these jobs by the usual methods is disproportionately greater than that required for other assembly jobs. A method for locating round head and socket head screws in such inaccessible spots has been devised by the writer, and it has proved to be very successful. The method may be applied to any size

or shape of screw head which requires an inserting tool for the purpose of tightening.

Holders, such as the ones sketched in the accompanying illustration, are made for the different screw types and sizes. A round head screw holder is shown at detail X. It is made from two pieces of strip steel, one of which is bent to an S-shape to serve as a handle, **A**, and the other of which is bent to an L-shape to serve as a clip, **B**. The writer used spot welding to fasten parts **A** and **B** together; however, any other practical method may be used. A slot, **C**, slightly wider than the screw thread diameter, is cut in the lower part of the handle; and, directly above the slot, a hole, **D**, is cut in the protruding portion of the clip. Hole **D** is slightly smaller in diameter than the

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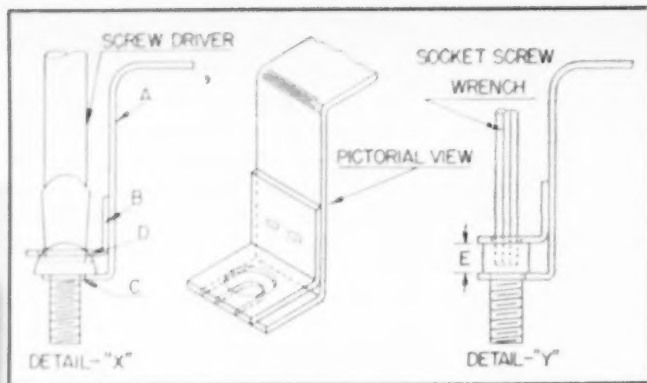
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Holders used to facilitate the location of screws in inaccessible spots

er a few times to start the screw into its tapped hole. After a few threads have been engaged, the holder is removed and the screw is tightened securely.

maximum diameter of the screw head, and yet it is large enough to accommodate a screw driver.

In operation, a screw is slipped into the slot in handle **A**, and the screw head is held in place by the clip. The worker locates the screw in its proper position and then turns the screw driv-

A holder for socket head screws is shown at detail **Y**. In this case, the distance **E** is fixed so that the screw head will be held securely by the underneath flat surface of the clip. The hole in the clip is made sufficiently large so as to readily accommodate a socket head wrench.

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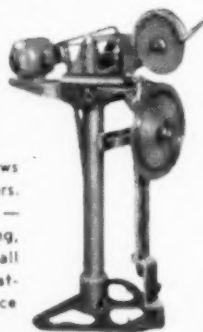
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## News of the Industry

### Drilling-Tapping Feed Introduced at A.S.T.E. Exposition by Beckett-Harcum

At the American Society of Tool Engineers' Exposition held recently in Philadelphia, the Beckett-Harcum Co., Wilmington, Ohio, introduced a new drilling-tapping feed which is designed to convert a drill press into a high production drilling and tapping machine. The feed is constructed to operate with any three-phase motor, with drilling-tapping depth controlled to

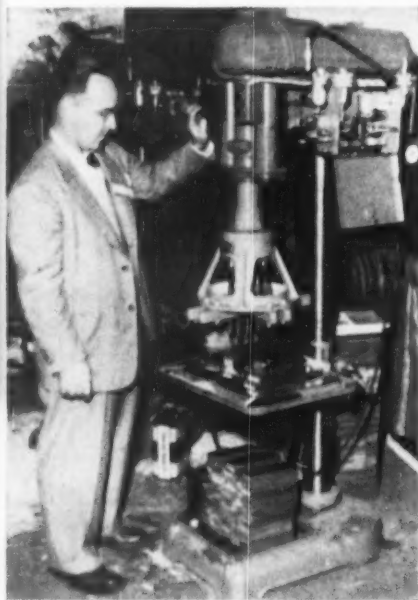
within 0.001 inch, the manufacturer claims.

A drill press equipped with the feed can be readily changed over from drilling to tapping operations by simply removing the drill and placing the tap in the drill chuck or multiple spindle drill head. The feed permits tapping on ten pounds of working air pressure. Tapping is accomplished at high speed with the same r.p.m. as used in drilling the material.

### Attendance Over 400 at Second A.I.E.E. Welding Conference

The attendance numbered over 400 at the Second Conference on Electric Welding held April 5, 6, and 7, in Detroit, Michigan. The conference was sponsored by the American Institute of Electrical Engineers acting in cooperation with the American Welding Society and the Industrial Electrical Engineers' Society of Detroit. Technical sessions on arc welding, research and equipment, instrumentation, special welding processes, and equipment and power supplies for resistance welding attracted the personnel who represented research groups, equipment manufacturers and users.

Highlights of the conference were the evening demonstration sessions sponsored by the Detroit Section of the American Welding Society. Demonstrations and exhibits were presented by 24 companies active in the electric welding field. Inert gas shielded arc welding, flash welding, spot welding,



Don Beckett, partner of Beckett-Harcum Company, is shown demonstrating use of new drilling-tapping feed in conjunction with multiple spindle drill head at recent A.S.T.E. Exposition.



stud welding, and measurements were among the subjects for which latest equipment and techniques were presented.

### SKF Honors Seven 20-Year Employees

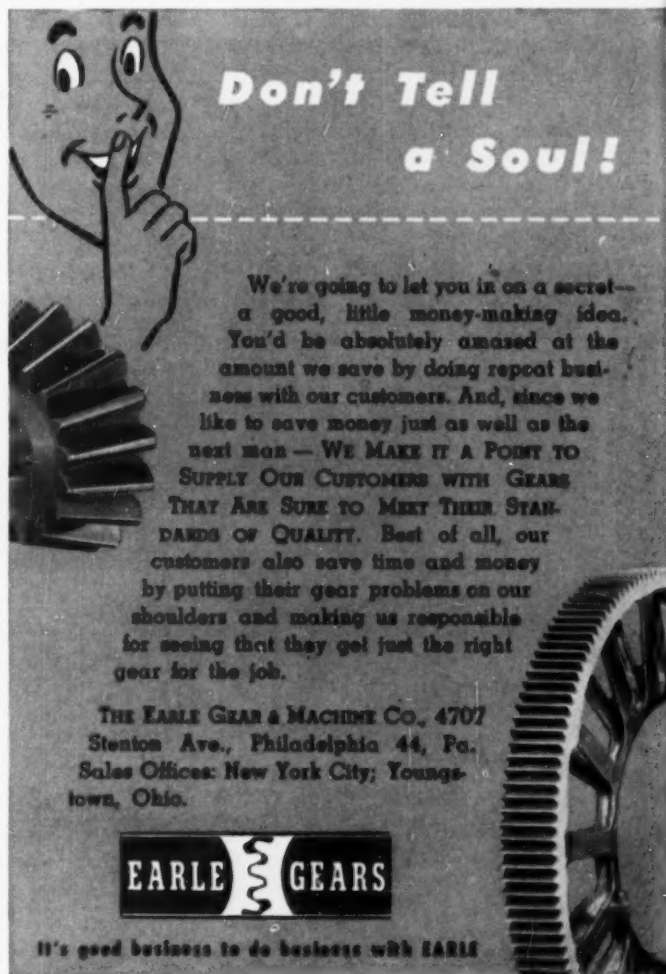
Seven employees who have completed 20 years of continuous service and one employee marking his 40th year were honored by SKF Industries, Inc., at a luncheon held recently at the ball and roller bearing firm's main plant at Front Street and Erie Avenue in Philadelphia.

J. R. Doughty, export sales manager, who joined the company in 1910, was presented with a silver platter by William L. Batt, president who is a 42-year veteran himself.

The company, which now has 369 persons on its honor roll, including 273 which are still in service, presented watches to Arthur M. Cheney; James B. Elvin; John P. Maguire; Harry D. George; Harry J. Sizer; William E. Hagen; and Mrs. Grace E. Nicely.

### Metal Powder Association Releases New Standard

A new standard has been compiled by the Standards Committee of the Metal Powder Association to fill a growing need in the expanding metal powder industry for acceptance tests on metal powder parts. Designated as the M.P.A. Standard 8-50T, "Tentative Method for Acceptance Tests on



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Structural Parts Made from Metal Powders," the standard describes procedures for testing a variety of pressed and sintered parts made from metal powders and specifies methods by which structural parts may be tested as a basis for acceptance.

Details of test and range of values to be obtained are to be agreed upon by the producers and users of the part within the framework of the standard. Tests described include chemical composition, density for oil-impregnated and non-impregnated parts, porosity, method of manufacture, dimensions and tolerances, mechanical properties, hardness, sample procedure and certificate of test. Drawings are included which show six examples of tests for mechanical properties.

The standard is to remain tentative for a period of three years during

which time suggestions for its approval are welcome. Copies of the standard may be obtained at a price of 25 cents each by writing to the Metal Powder Association, 420 Lexington Ave., New York 17, New York.

### Eleventh Summer Management Course

The Summer Management Course, to be held June 12-24 at the State University of Iowa in Iowa City, will emphasize production planning, job evaluation, motion and time study, wage incentives, and related subjects. The course, which is being offered for the eleventh year, is intended for factory managers, foremen, industrial engineers, methods and time study analysts, cost accountants, and office executives and is designed to present the best in management methods and

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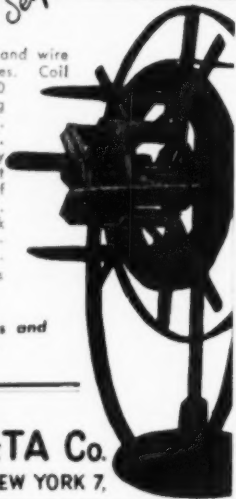
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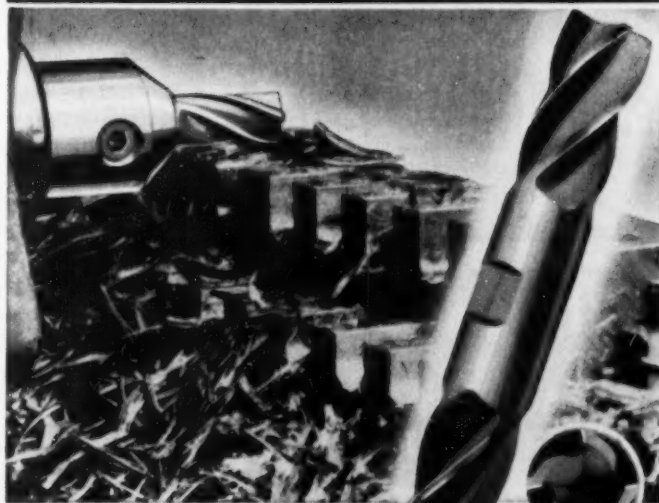
The mornings will be devoted to meetings of the entire group for lectures and discussions surveying the major techniques of scientific management, including a thorough review of the fundamentals of work simplification. The afternoons will be devoted to project work and instruction in the various optional subjects in which each individual is most interested. Daily luncheon meetings will provide an opportunity for those enrolled to enlarge their acquaintance and to present their ideas to the entire group. The dinner meetings will bring outstanding visiting lecturers to the group.

The University's Eastlawn Dormitory has been set aside for the exclusive use of those attending the course to provide for the maximum interchange of ideas. Registration and communications concerning the course should be sent to J. Wayne Deegan, 122 Engineering Bldg., State University of Iowa, Iowa City, Iowa.

### Periodical Microfilm Service Announced by Gardner Publications, Inc.

Gardner Publications, Inc., 431 Main St., Cincinnati 2, Ohio, has entered into an agreement with University Microfilms, 313 N. First St., Ann Arbor, Mich., whereby issues of MODERN MACHINE SHOP and PRODUCTS FINISHING will be made available to libraries in microfilm form.

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### A.S.T.E. Research Foundation Committee Appointed

Herbert L. Tigges, president of the American Society of Tool Engineers, has announced the appointment of the following committee to coordinate plans for the setting up of the A.S.T.E. Research Foundation: A. M. Sargent, president, Pioneer Engineering & Manufacturing Company; William H. Smila, master mechanic, Plymouth Motor Division, Chrysler Corporation; Professor O. W. Boston, University of Michigan; and Professor J. N. Edmondson, Ohio State University. Mr. Sargent is chairman of the committee, and Frank W. Wilson, technical director of the A.S.T.E., has been assigned to work with the group in formulating final plans.

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An initial fund of \$25,000 for the work of the Research Foundation was appropriated by the A.S.T.E. at the society's annual director's meeting held recently in Philadelphia. The purpose of the foundation is to carry on basic production research for the benefit of industry.

### **Automatic Steel Products, Inc. to Manage Cleveland Tapping Machine Company**

A. M. Wickwire, president of Automatic Steel Products, Inc., Canton, Ohio, has announced that the corporation has taken over the active management of The Cleveland Tapping Machine Co., Hartsville, Ohio, and will continue its operation under that name. A. R. Wise has been appointed a vice president of Cleveland Tapping and will be in charge of sales. The company is well known in the machine tool field as a manufacturer of high production vertical and horizontal tapping machines with multiple, stationary, and movable heads, as well as feeding and holding devices for work of any size or shape.

Under the expansion policy, the new management will continue to produce the established Cleveland line and also develop new markets and machines. Other Automatic Steel products include spunsteel pulleys, mercury-actuated clutches, automotive pumps, jacks, lifts, and grinding wheels.

### **Harmony in Grays for Industrial Equipment**

First unified efforts of industry to reduce the number of colors for industrial apparatus, machines, and equipment are beginning to show results due to a unanimous agreement on four



**TAPS**

Cutting tapping costs is seldom attained through cheaper taps. Most frequently lowered costs come from skillful tap design, experienced workmanship and engineering that fits the tap to its specific job.

Wood & Spencer apply these three essentials to every tapping job. That's why hundreds of cost-minded production men use Wood & Spencer Taps week after week. Their experience tells them that, with Wood & Spencer Taps they can be sure of lower costs. Let us help with your tapping problems.

*The Wood & Spencer Company*  
Hartsville, Ohio

accurately defined grays as standard finishes. The American Standards Association has announced the adoption of these standard grays following a consensus reached by 18 organizations and groups representing all classes of manufacturers and users of such equipment.

General acceptance of the new standard on "Gray Finishes for Industrial Apparatus and Equipment" (ASA

Z55.1-1950) by individual manufacturers and purchasers of industrial equipment and machines is expected to reduce considerably the cost of finishes and finishing. The standard will be of further value to purchasers by making it easier to specify and match grays and to produce color harmony of machines and other equipment purchased from different manufacturers. Color guides are expected to eliminate the

haphazard choice of shades from the limitless possible shade variations. Color chips of the standard grays have also been made available for use as masters for inspection by a visual comparison method appended to the standard.

Copies of the new standard on "Gray Finishes for Industrial Apparatus and Equipment" (Z55.1-1950) are available at 35 cents each from the American Standards Association, 70 E. 45th St., New York 17, N. Y. Four color chips are also available for \$2.25. The chips and the standard may be purchased together at a price of \$2.50.



Jay Dee employs an entirely new clutch principle, designed specifically to eliminate tap breakage. Instead of using coiled springs to provide driving pressure, it has a resilient material . . . 150 times more effective than steel . . . to produce safe torques at all times. This new attachment is simple as well as safe; definite torque settings for given tap sizes and taps can be changed in a few seconds without wrenches.

Can be used for horizontal or vertical tapping, stud driving, blind or through holes—on all reversible machines.

**LARGE TAP  
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K-1 unit handles taps  $\frac{1}{2}$ "- $1\frac{1}{4}$ " USS, a range normally requiring three attachments. Other units also available.

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## M.P.A. Elects Officers and Directors

At the annual business meeting of the Metal Powder Association held recently at the Hotel Book-Cadillac in Detroit, Robert L. Ziegfeld, acting secretary of the association, announced that for the coming year B. T. duPont, sales manager of the Plastic Metals Division of National Radiator Company, was reelected president; T. L. Robinson of the Wel-Met Company was reelected vice president; and W. P. Schenck, superintendent of the Scrub Oaks Division of Alan Wood Steel Company, was elected chairman of the board. New directors elected were H. W. Fischer, American Electro Metal Corporation and Mr. Robinson. The following men continued as directors of the association: E. P. Palmer, Metals Refining Company; F. F. White, S. K. Wellman Company; and Mr. Schenck. The present board consists of three fabricators of metal powder parts and three producers of metal powders.

## Merit Products, Inc., Moves to New Quarters

All officers and manufacturing facilities of Merit Products, Inc., have been moved from Los Angeles to another building in Culver City, California. The building, formerly occupied by the Culver City Star News at 4023 Irving Place, has been completely renovated to accommodate fabrication, assembly, warehousing, and shipping facilities, as well as 2,000 square feet of office space for executive personnel.

The move was necessitated by the addition of two new products to the company's line of sanding and automotive equipment; namely, the "Sand-O-Blok" hand sander and "Klip-Kit" for auto visors. The new quarters pro-

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vide three times the amount of space as the previous location on Melrose Avenue which served as headquarters since the company's formation almost ten years ago.

### Fay Henry Willey

Fay Henry Willey, founder and president of Willey's Carbide Tool Company, Detroit manufacturer of

tungsten carbide tools, died May 6, 1950. Mr. Willey, who was 53 years old, was born in Weston, West Virginia, December 9, 1896. He was one of the pioneers in the development of the tungsten carbide industry and was also well known in the industrial diamond business. He lived at Willey's Acres near Brighton, Michigan, at the time of his death.



Fay Henry Willey



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### N.S.M.P.A. Elects Officers and Directors at Annual Meeting

The annual membership meeting of the National Screw Machine Products Association was held at the Bedford Springs Hotel, Bedford Springs, Pennsylvania, from May 21 to May 24. The first business session of the meeting was held on Monday, May 21 and included the election of officers and eight directors; Cecil E. Lucas, Lucas Screw Products, Inc., Rochester, N. Y., president; Harry F. Fischer, Fischer Special Mfg. Co., Cincinnati, Ohio, vice president; and William N. Grass, M. J. Grass Screw Machine Products

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**WATTS BROS. TOOL WORKS**

Wilmerding, Pa.

Co., Buffalo, N. Y., treasurer. New directors elected for two-year terms are Otto Albrecht, Babson-Dow Mfg. Co., Roxbury, Mass.; E. A. Bartlein, Western Machine Co., Milwaukee, Wis.; K. E. Brooks, Huron Automatic Screw Co., Port Huron, Mich.; S. E. Casson, National Acme Co., Detroit, Mich.; Harold C. Close, Waterville Mfg. Co., Waterville, Conn.; George L. Hunt, Hunt Screw & Mfg. Co., Chicago, Ill.; Ralph H. Lightner, Titan Metal Mfg. Co., Bellefonte, Pa.; and C. R. Wedler, Jr., Wedler Bros., Inc., Cleveland, Ohio.

Directors who still have one year to serve of their two-year terms include Fred J. Barry, Worcester Taper Pin Co., Worcester, Mass.; Thomas R. Bonner, Approved Mfg. Co., Detroit, Mich.; Kenneth B. Champ, Smith Brothers Mfg. Co., Findlay, Ohio; A. W. Gaebele, New Britain Machine

Co., New Britain, Conn.; Ray Imsande, Imsande Screw Products Co., Cincinnati, Ohio; Samuel Lancaster, Drexel Screw Products Co., Chicago, Ill.; M. V. Lowe, Whitley Products, Inc., Columbia City, Ind.; and C. J. Nolin, Auburn Spark Plug Co., Auburn, New York.

The first business session was held on Monday and highlighted a panel discussion which included as speakers John R. Cox of Balas Collet Mfg. Co., Cleveland, Ohio; William N. Grass, Buffalo, N. Y., and Orrin B. Werntz, Cleveland, Ohio, treasurer and executive secretary respectively of N.S.M. P.A.; R. S. Collier of Cincinnati Milling and Grinding Machines, Inc., Cincinnati, Ohio; and Tell Berna, National Machine Tool Builders' Association, Cleveland, Ohio.

Tuesday's session featured as speakers Col. Horace F. Sykes of the Muni-

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CARBIDE ROTARY CUTTERS  
—MACHINE GROUND

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tions Board in Washington who spoke on "Screw Machine Products Problems in Industrial Mobilization Planning"; A. M. Wilson of Liberty Mutual Insurance Co., Boston, Mass., who covered the subject of "Group Insurance Under Present Day Labor Practices"; and W. F. Coates, Delco Products Corp., Dayton, Ohio, who discussed "Imaginative Manufacturing."

The meeting closed with the annual

banquet on Wednesday evening, at which time gold micrometers were presented to those having 40 or more consecutive years in the industry. Special merit certificates were also awarded.

### Allis-Chalmers Elects Officers and Directors

The stockholders of the Allis-Chalmers Manufacturing Company recently elected Walter Geist to his ninth term as president of the company and reelected all other officers and directors of the firm. Directors renamed at the annual meeting are James M. Barker, Fred O. Bohen, W. C. Buchanan, Hugh Comer, James D. Cunningham, W. C. Johnson, Walter Kasten, Ernst Mahler, Louis Quarles, Leigh Willard, and W. A. Roberts. Mr. Geist was also reelected to the board.

Reelected officers in addition to Mr. Geist are Mr. Johnson, executive vice president in charge of machinery division; Mr. Roberts, executive vice president in charge of the tractor division; E. H. Brown, vice president in charge of engineering development; W. E. Hawkinson, secretary and treasurer; J. A. Keogh, vice president and comptroller; J. L. Singleton, vice president and director of sales for the general machinery division; and H. W. Story, vice president and general attorney.



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—the all-purpose grinding wheel

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The same Rams-Head Wheel will, after heavy stock removal, finish grind all metals and produce a finish comparable to that produced by a fine grit wheel. Rams-Head Wheels run cool and load slowly because of porous structure. Write for price list.

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Other officers renamed by the board are: C. P. Allendorf, assistant controller; N. D. Johnson, assistant secretary; G. F. Langenohl, assistant treasurer; and J. F. Ryan, assistant secretary and assistant treasurer.

### Detroit A.S.T.E. Chapter Sponsors Series of Carbide Meetings

A series of special educational meetings dealing with the latest developments in the use of carbides in industry is being sponsored by the Detroit Chapter of the American Society of Tool Engineers. The first meeting was held at 7:30 p.m., May 4th, in the Rackham Building, with George Eglinton, president of Lincoln Park Industries, Lincoln Park, Michigan, speaking on "Carbide Die Developments."

The second carbide meeting will be the regular chapter meeting on June 8th. It will cover "The Place of Carbides, Cost Cutting Alloys, and High Speed Steels in Industry." The technical material is to be presented by a panel of eight experts with Carl J. Oxford, chief engr., National Twist Drill & Tool Co., Rochester, Michigan, as chairman. Panel members include: Fred Bohle, chief engr., Illinois Tool Works; John C. Gibson, carbide engr., Pratt & Whitney; L. H. Goddard, vice president, Goddard & Goddard Co.; J. H. Horgan, chief engr., Union Twist Drill Company; Leo W. Reuland, production mgr., Small Tool Div., Barber-Colman Co.; Earl Wennerstrom, chief engr., Weldon Tool Co., and E. D. Wiard, Illinois Tool Works.

Other meetings on carbides featuring presentation of technical papers, panel discussions, and so on, will be held on the third Thursday of every month beginning in September.

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SAW**



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*Brazes a Joint  
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the saw  
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This "Oliver" makes brazing a simple operation. Makes a perfect braze in a few seconds. A turn of the switch makes heat available. Control of heat assures proper temper of saw blade. Uses little current. Recommended by 37 band saw makers, and thousands of operators. Write for Bulletin 462.

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## Did You Know?---

E. H. Forsstrom, assistant manager of the Watervliet, New York plant of the Allegheny Ludlum Steel Corporation, has been appointed to the newly created position of director of training. W. J. Baldwin, chief metallurgist of the Watervliet plant, has been appointed to succeed Mr. Forsstrom as assistant plant manager.

The Liberty Equipment Co., Los Angeles, Calif., has announced its appointment as exclusive West Coast jobber for the Marshall Steel Co., McCook, Ill., manufacturer of ground flat stock tool steel in water, oil, and air-hardening types.

— o —

The Whiton Machine Co., New London, Conn., manufacturer of lathe chucks, centering machines and gear

cutting machines, has appointed the following dealers to handle the sales of its products in the various areas: American Steel & Supply Co., Chicago, Ill.; Hibbard, Spencer, Bartlett Co., Evanston, Ill.; The Keiser-Van Leer Co., Bloomington, Ill.; Clarke F. Sanford & Co., St. Louis Mo.; South Bend Supply Co., South Bend, Ind.; Industrial Equipment & Supply Co., Benton Harbor, Mich.; Miles Machinery Co., Saginaw, Mich.; Howard & Smith, Inc., Detroit, Mich.; McKee-Kenyon & Co., Detroit, Mich.; Neill-LaVielle Supply Co., Louisville, Ky.; Steel City Tool & Supply, Pittsburgh.

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	Cylinder (housing)	Pressure Plate	Hydr. Piston Plate
Part Produced	12"	12"	12"
Approx. Pitch Diameter	1.016	.976 (2 pcs.)	.562 (2 pcs.)
Length of teeth cut (in.)	85-90	200-240	200-240
Output per hour	24 secs.	24 secs.	24 secs.
Machine Cycle Time	...	1/10th that for generating tools	
Estimated Tool Maintenance Cost	None Required	Approx. 2 hrs. total (complete set-up)	
Change-over time	12 (single spindle)	Six (8-spindle type)	
Equivalent number of generating machines for same production	...		
... No tool grinding required in first 5000 pieces produced.			
Maximum Allowable Errors	Involute profile	0.0004 in.	
	Index	0.001 in. with any tooth	
	Parallel	0.001 in. per inch of tooth	

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BULLETIN 1800-47

## MICHIGAN TOOL CO.

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## Did You Know?---

The National Tool Co., Cleveland, Ohio, has announced the appointment of the **Tri-State Machinery Co.**, with offices at 3014 W. Liberty Ave., Pittsburgh 16, and 320 E. 31st St., Erie, Pa., as sales representative in the western Pennsylvania area for its line of National-Cleveland cutting tools.

— o —

R. R. Zisette, general sales manager of SKF Industries, Inc., has announced the appointment of **Norman A. Strang** as assistant advertising manager. Mr. Strang will be in charge of direct mail and catalog development.

— o —

**D. F. Cisney** has been named advertising manager of A. Schrader's Son, Division of Scovill Manufacturing Company, Inc., replacing **D. S. Hunter** who has resigned.

— o —

Norton Co., Worcester, Mass., has announced the appointments of **W. Earle Shumway** as manager of the sales engineering department, abrasive division, and **Fred L. Curtis** as sales manager in the western region.

— o —

The Minnesota Mining & Mfg. Co., St. Paul 6, Minn., has promoted **Clarence M. King**, former assistant treasurer and assistant secretary, to the office of treasurer. **George H. Schoettly** and **Edwin H. Church** have been elected assistant treasurers.

— o —

**Harry Waldes** has been named executive vice president of Waldes Kohinoor, Inc., Long Island City 1, N. Y., manufacturer of "Truarc" retaining rings and other fastening devices. Mr. Waldes will direct all administrative affairs of the company.

**No More Spoiled Tools or Work For Us**  
**We Use 100% HARD ROCK MAPLE LAMINATED BENCH TOPS**




Model "R"  
**Reinforced with Steel Rods**  
 For tool and die rooms, inspection, shipping and production departments.  
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 Six staggered cutting edges give shearing cut that eliminates all chatter.  
*Send for catalog BC1.*  
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### Did You Know?---

**Richard H. DeMott**, vice president in charge of sales of SKF Industries, Inc., has been elected president of the Sales Managers' Association of Philadelphia. Mr. DeMott, who is also vice president of the Exhibitors Advisory Council, has been associated with the Philadelphia group since 1935 and will take office next October.



### MINIATURE MASK

Keeps out metal grindings, saw dust, lint, coal dust, cement dust. Has 9 sq. in. filter. Weighs only 1 oz. Handy as a pair of glasses. . . . order today.

Sample \$1.00 p.p.  
**Jerry Bryant Products,**  
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**Wallace C. Manville** has been employed as resale representative in the Denver territory for A. Schrader's Son, Division of Scovill Manufacturing Company, Inc. Mr. Manville was formerly with U. S. Rubber Company.

— 0 —

**Wynn F. Rossiter**, assistant to the vice president of The Carpenter Steel Company, died recently in Hartford, Connecticut. Mr. Rossiter had been district sales manager of New England for many years.

— 0 —

**Roland Wilkins**, consultant for the American Machine & Foundry Company, has been placed in charge of sales of DeWalt high-speed radial saws, AMF Industrial Lowerators, and AMF Wahlstrom chucks in northern Texas, Oklahoma, and parts of Arkansas.

— 0 —

At the annual meeting of stockholders of Crucible Steel Company of America, New York City, the following four directors were reelected for three-year terms: **W. P. Snyder, Jr.**, chairman of Crucible board; **W. W. Anderson**, president and treasurer of Bundy Tubing Company; **R. E. Christie**, executive vice president of Crucible; and **R. S. Polster**, vice president of Crucible in charge of manufacturing.



### "SHUR-GRIP" DROP FORGED HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly—will not slip—keeps hammer head in shape longer—to make remodeling easier, quicker, surer, less expensive. Write for folder.

**LAWRENCE H. COOK, INC.**

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### Did You Know?---

The Durant Mfg. Co., Milwaukee 1, Wis., has announced the appointment of **Ellsworth W. Crane** as mid-west regional sales manager for Durant Productimeter counting and measuring machines in the territories of Milwaukee, Chicago, Cincinnati, Cleveland, Detroit, Indianapolis, and Pittsburgh. The company has also announced the appointment of **John C.**

**Turner** as representative for counting and measuring machines in the general industrial and textile fields in Georgia.

— O —

C.T.C., Inc., Commercial Trust Bldg., 15th & Market Sts., Philadelphia 2, Pa., is now serving as distributor in the Philadelphia area, under the direction of **J. K. Smith**, for **Whitman & Barnes** (twist drills, reamers, special tools); **Bay State Tap & Die Co.** (taps, dies); **The L. S. Starrett Co.** (hack saws, band saws, flat stock, dial indicators, mechanics tools); **Acromatic Tool Co.** (special high speed and car-

bide tipped tools); **American Swiss File & Tool Co.** (files); **Melin Tool Co., Inc.** (end mills, live centers); **Wetmore Reamer Co.** (reamers); **Molina Industrial Diamond Co., Inc.** (diamond truing tools, diamond wheels, diamond powder); **Circular Tool Co., Inc.** (circular saws); **H. P. Smith & Associates, Inc.** (rotary files, grinding burrs); **Super Tool Co.**; and **Carl Wirth & Son** (hollow mills).

## Improved Tap Head Makes **TAPS LAST LONGER!**

The unique friction clutch on this new, improved Procunier high speed tapping head practically "thinks" for the operator... making taps last longer, cutting production time and cost. This double-cone clutch engages the drive and reverse shells with a velvety "cushioned" action. Tap driving power is automatically regulated by the amount of pressure applied to it. "Blind" tapping is done as easily as through tapping. The operator can quickly detect dull or "loaded" taps just by the pressure needed to drive them. This increased sensitivity and smoothness results in: fewer broken taps; less operator skill needed, faster, lower cost tapping! This improved Procunier tapping head has many more time and money saving features. Write today.

Procunier High Speed Tapping Heads are available in 4 sizes with capacities from No. 0 to 1 1/8".

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**PROCUNIER SAFETY CHUCK CO.**  
12 S. Clinton St., Chicago 6, Ill.

Gentlemen:

Please send your illustrated brochures which give complete prices and specifications on Procunier High Speed Tapping Heads and Machines.

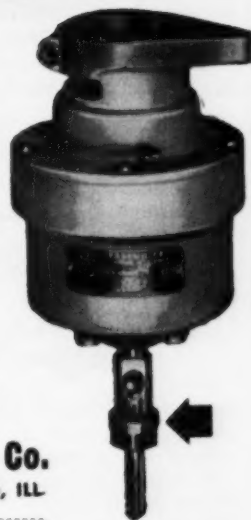
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State ...



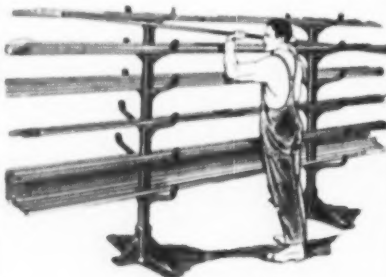
**PROCUNIER  
"TAP SAVER"**

Exclusive "Tru-Grip" tap holder, lighter, smaller in diameter, minimizes "flywheel" effect. It affords easier tapping close to wall or shoulder, eliminates "chewed up" tap shanks.



## HOW YOU CAN BOOST YOUR PROFITS

The BROWN TIME-SAVING RACK saves the time previously lost end-hauling each bar of stock its entire length from the old-style, closed-side Rack, the Brown Rack requiring but a few inches of side movement. Each length, width and thickness of stock is displayed in gold-fish visibility for instant selection. Workmen waiting for stock are served without waste of time, and returned to their production machines to turn out a maximum of output.



Any time you require additional storage space, all you need do is to add more units. If you want to relocate it at any time, you can do so quickly for it is unattached to the building. It is a simple, durable article made of metal in five styles. It can't burn, warp, sag or twist; depreciation is practically nil. SEND FOR BULLETIN No. 26-P DESCRIBING THE BROWN TIME-SAVING RACK.

**BROWN ENGINEERING CO.**

120 N. THIRD ST. READING, PA.  
RACKS • VISES • CLUTCHES • COUPLINGS

## Did You Know?---

The Arcos Corp., Philadelphia, Pa., manufacturer of stainless low alloy high tensile and non-ferrouselectrodes, has announced three appointments to its staff as follows: **Bernard E. David**, special field engineer, Los Angeles; **Walter Gordon List**, special field engineer, Ohio and western Pennsylvania; and **J. J. Schlass**, sales representative, Philadelphia.

Sterling Electric Motors, Inc., New York City and Los Angeles, has announced that **Carl E. Johnson** has been elected chairman of the board and **Earl Mendenhall** as president to succeed Mr. Johnson.

**David S. Hunter** has announced his resignation as advertising manager of A. Schrader's Son, Division of Scovill Mfg. Co., 475 Vanderbilt Ave., Brooklyn 17, New York.

**William P. Gillespie**, manager of the Market Requirements Dept., Henry Disston & Sons, Inc., Philadelphia, has been named manager of chain saw sales for the company.

**L. D. Holland**, assistant to the president and a member of the board of directors of E. F. Houghton & Co., Philadelphia, died recently after a long illness. Mr. Holland was associated with the company for 23 years.

The Cleveland district sales office of the Heppenstall Co., Pittsburgh, manufacturer of steel forgings, has been moved from 311 Rockefeller Building to a more convenient location at 506 Terminal Tower Building in Cleveland. **R. E. O'Brien** is the sales representative for this district.

### Did You Know?---

**Oliver W. Bonnafa** was recently elected vice president in charge of research engineering at the Lapointe Machine Tool Co., Hudson, Mass. Mr. Bonnafa has been associated with the company for over 30 years.

— o —

**Walther H. Feldmann**, who has resigned as president of the Electric Machinery Mfg. Co., Minneapolis, a subsidiary of the Worthington Pump & Machinery Corporation, has been named vice president in charge of sales for Worthington. Other appointments made by Worthington are **John J. Summersby**, vice president in charge of purchases; **Frederic W. Thomas**, general manager of purchases; and **Carleton Reynell**, general representative, sales and purchasing departments.

The board of directors of the **American Machine & Foundry Company** were reelected at the annual meeting of stockholders held recently at Flemington, New Jersey. The directors are **Morehead Patterson** (chairman), **George Arents**, **George S. Hastings**, **Daniel H. Haynes**, **J. W. Herman**, **George S. Hills**, **John W. Hooper**, **Knox Ide**, **G. A. Ingalls**, **Roland P. Soule**, and **R. F. V. Stanton**.

— o —

**Raybestos-Manhattan, Inc.**, has moved its New York offices from the Equitable Building at 120 Broadway to 500 Fifth Avenue, New York City. The offices moved include the New York and New England district office of the Manhattan Rubber Division and the Corporation Export Department, which includes the Allied Asbestos and Rubber Company (Export), Incorporated.

# Baldor

## BALANCED GRINDERS FOR PRECISION WORK

Grinder No. 1010 shown here is a rugged 130 lb. general service grinder with 36 & 60 grit 10" wheels. 3 phase, 1725 RPM motor will take plenty of overload and abuse. Will not burn out. Balanced wheels, dynamically balanced armature. Wide clearance between wheels and motor frame allows working on large or odd-shaped pieces.

*Clip this ad to your  
letterhead and mail  
for Bulletin 321-D.*

### BALDOR ELECTRIC COMPANY

Motors - Grinders - Battery Chargers

4380 Duncan Ave.,

St. Louis 10, Mo.



\$110.00

Heavy duty type

## Did You Know?---

Tammis Industries, Inc., Chicago, has added two new men to its sales organization; namely, **G. J. Boyer**, who will operate nationally as sales representative for raw materials in the paint, polish, insecticide, sanitary and janitor supply fields, and **Walter Moser**, who will act as sales agent for raw materials in the Columbus, Dayton, Cincinnati and Louisville areas.



**Quick Shipment on TAPER ATTACHMENTS**  
For All Lathes Old or New—9" to 24" swing  
Write for Bulletin

**\$29.50 to \$125.00**

**MASTER-TAPER COMPANY**  
4531 N. Beacon Street  
Chicago 40, Illinois  
Exclusive Mfrs. of Taper Attachments

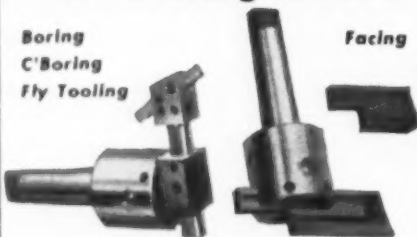
## Cut Boring Costs

Boring

C'Boring

Fly Tooling

Facing



Blind Hole Bottoming

Many enthusiastic users report that the Behr Boring Bar actually pays for itself in the first four weeks of operation. Just ask the man who uses one.

This proven, patented bar is chatter proof, extremely accurate and ultra efficient. Has interchangeable blades and accessories.

It is unequalled for versatility and efficiency.

Can you afford not to get the facts?

WRITE FOR CATALOG TODAY

**BEHR**

PRODUCTS COMPANY  
WARREN, MICHIGAN



**Motor Tool Manufacturing Company**, producer of live centers, has moved to a new factory in northeast Detroit. The new address of the company is P. O. Box 3805, Park Grove Station, Detroit 5, Michigan.

— 0 —

**E. W. Bullard**, president of the E. D. Bullard Company, has announced the promotion of **George R. Huffman** to advertising manager and **E. W. Bullard, Jr.** to assistant to the vice president in charge of sales.

— 0 —

**Francis L. Kemp**, manager of the Vertical Turbine Pump Division, Worthington Pump & Machinery Corp., Harrison, N. J., died suddenly at his home recently. Mr. Kemp served with the company for 37 years.

— 0 —

The **Metal & Thermit Corporation** has moved its general offices from 120 Broadway to a new location at 100 E. 42nd St., New York 17, New York.

— 0 —

The retirement of **C. F. Harwood** and **Frank D. Shumate**, sales veterans who were employed by the Worthington Pump & Machinery Corporation for over 40 years, has been announced by the corporation.

## CARROLL

### DIVIDING HEADS



Catalog on Request

3 SIZES - 4 MODELS - 6" to 12"

**TROYKE MFG. CO.**

4422 APPLETON ST. CINCINNATI 9, OHIO

### Did You Know?---

George Demougeot has been appointed plant manager of Sperry Products, Inc., Danbury, Conn., according to J. B. Farwell, president of the firm.

— o —

The Adamas Carbide Corp., Harrison, N. J., has announced the establishment of a Detroit sales office at 22525 Hoover Road to service its Michigan accounts. K. Preston Hockenbery will manage the new sales office.

— o —

E. W. Connolly has been appointed sales manager of the Detroit district of Haynes Stellite Division, Union Carbide and Carbon Corporation. Mr. Connolly, who has been associated with the division for 11 years, succeeds R. D. Gunther who has retired.

— o —

Appointment of Ray P. Johnson as administrative assistant to Roy C. Ingersoll, the newly elected president of the Borg-Warner Corporation, was announced recently. Mr. Johnson is a member of the board of directors of Borg-Warner and first vice president of the Morse Chain Company, one of the corporation's divisions.

— o —

At a recent meeting of the board of directors of The Bingham-Herbrand Corp., Toledo and Fremont, Ohio, Roland J. Ahern, president and general manager of The Billings & Spencer Co., was elected as a member of the board. Bingham-Herbrand acquired control of Billings & Spencer in 1949.

— o —

John C. Jensen, Inc., Chicago export sales firm, has been appointed by the Portable Tools Division of Cummins Business Machines, Inc., Chicago, to handle export sales of the Cummins line of saws, sander-saws, planer-saws, drills, and polishers.

### FLAT OR GROOVED RACE BALL THRUST BEARINGS WITH BRONZE RETAINERS



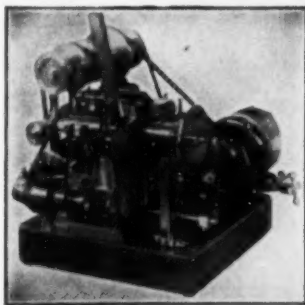
We can make them up to 25" outside diameter. We are geared to handle all of your thrust bearing needs.

#### Send us your blueprints

Makers of all types of dependable thrust bearings for over 30 years.

### ACORN BEARING CO.

66 Stanley St., New Britain, Conn.



### WALTHAM

#### Pinion and Gear Cutting Machines

with revolving cutter will make 1, 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to 1 1/2" dia. Blanks are held and indexed by work spindle and usually supported by a tall center. Only straight teeth can be cut. Write for Bulletin No. 112.

### WALTHAM MACHINE WORKS

WALTHAM

MASS.

Pinion and Gear Cutting Machine, Thread Milling Machine, Cylindrical Sub-Presses, Cutter Sharpening Machine, Small thread milling and gear cutters, Small special machinery.



## Book Reviews

**Gear Cutting Practice.** Third Edition. By Fred H. Colvin and Frank A. Stanley. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. 532 pages. Illustrated. Cloth binding, board covers. Price, \$4.75.


A practical machinists' guide to gear cutting methods and standards, this

book presents descriptive data on all aspects of gear cutting practice. It describes the various types of gears, setting up and operation of machines for producing gears, cutting and finishing methods, and so on. Completely revised to inform the reader of the present-day advances in the field of gear cutting, the book presents data on carbide-tipped hobs, hobbing speeds and feeds, bevel-gear standards, methods of cut-

ting bevel gears, involute splines, shaving and lapping methods of finishing gear teeth, and inspection records.

The book is divided into 11 sections and contains only that theory which is essential to a clear understanding of the terms used. Each type of gear in common use, such as spur, helical, herringbone, plain and spiral bevel, is illustrated, and the methods by which the various gears are cut are described. Internal gears are also discussed. Machines and methods for making gears and for checking their accuracy are also illustrated, and the standards adopted by the

**WHITNEY METAL**  
**TOOL COMPANY**  
**39 YEARS EXPERIENCE**



**WHITNEY-JENSEN**  
OUR NEW  
**CATALOG**  
Shows an Extensive Line of  
**PUNCHES — SHEARS**  
**FOOT PRESSES — POWER PRESSES**  
**DIES and SMALL TOOLS**  
Send for Your Copy Today

**WHITNEY METAL TOOL COMPANY**  
**110 FORBES STREET, ROCKFORD, ILLINOIS**

American Standards Association and the American Gear Manufacturers Association are outlined.

**Grading of Diamond Powder, Commercial Standard CS123-49.** Second Edition. Compiled by Commodity Standards Division, National Bureau of Standards, and distributed by Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price, 5 cents per copy (discounts on quantities of 100 or more copies).

The first edition of this standard was issued in 1945 at the request of the War Production Board. In 1948, a revision was requested by the Industrial Diamond Association of America, Inc., and has been endorsed by prominent producers, distributors, and users of diamond powder. The standard presents information on material, size designa-

tions, average particle size and size ranges, impurities, methods of sampling and inspection, and method of indicating compliance with the standard.

**Testing by the National Bureau of Standards.** Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 93 pages. Price, 25 cents; Foreign, 33 cents, U. S. exchange.

Known as NBS Circular C483, this booklet fully describes the Bureau's test policy, presents general information on testing, and lists fees for most of the test work that is done. Fees listed include those for tests on electrical standards and instruments; standards of length, mass, and time; pyrometers; fuels, radioactive standards; mechanical instruments; and optical instruments.

## The New Comet Tool Holder

with **ECCENTRIC Adjustment**

Fits all  $\frac{3}{8}$ " dia. bars, specially designed for precision boring and internal threading, for holes  $\frac{3}{32}$ " and up. Shank:  $\frac{3}{8} \times \frac{5}{8}$ ". Collets for smaller bars available.



### Advantages:

**No wrenches**

**No nuts**

**No shims required**

## COMET TOOL COMPANY

738 BROADWAY

NEW YORK 3, N. Y.

Makers of famous COMET Internal Threading and Boring Tools

## Machining Films

A series of five 16 mm. motion picture films dramatically depicting the major advantages and special design features of its turning equipment in wide use throughout the metal-working industries has been completed by the Monarch Machine Tool Company. The films are intended for showings to trade and industrial groups, manufacturers, production engineers, tool

supervisors and superintendents, master mechanics, plant and works managers or others concerned with problems of cost reduction, as well as machining quality involving turning operations.

"The Air-Gage Tracer," a film which has a running time of 23 minutes, covers the latest contributions to tracer-controlled duplication by showing a variety of typical job applications relating to contour turning, facing and boring, as well as multiple-diameter

shaft turning, on Monarch engine lathes from 10 to 32 inches equipped with the Air-Gage Tracer. It includes a complete discussion of design and operational principles upon which this duplicating device is based.

"The Speedi-Matic," a film with a running time of 23 minutes, is a fast-moving presentation of the Speedi-Matic, an Electronically-controlled highly-productive precision hand screw machine. Outstanding design features and typical operational sequences are illustrated and discussed.

"The 10-Inch Model EE Sensi-

## For Quick, Efficient On-Location Clamping Use Knu-Vise Portable Vises



P-400

For clamping when space is limited

Equipped with various spindle types—steel or copper, or rubber capped



FGP-400

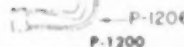
Spindle automatically adjusts itself to total thickness of materials held



P-1203



P-1204



P-1206

Available in 4 standard throat gaps—1 1/2", 2 1/4", 3 1/2" and 6"

Whether you clamp tiny parts requiring pressures of a few pounds or want to hold together huge assemblies that need pressures of around 1800 pounds, Knu-Vise Toggle-action pliers will provide the dependable service you need.

Made to most exacting specifications resulting from exhaustive laboratory tests and years of practical use among leading industries.

Special models on request

Ask for complete catalog

Consult us direct or our representative engineer near you

Buffalo, N. Y., J. H. England  
Chicago 20, Ill., Larry P. Wood  
Columbus, Ohio, Arthur Gangloff  
Dallas, Texas, C. G. Wilson Co.  
Dayton 2, Ohio, W. F. Grimes  
Detroit 2, Mich., 2906 W. Grand Blvd.  
Glendale, Calif., Art Lewis Prod. Equip. Co.  
Houston, Texas, L. H. Creasy  
Indianapolis, Ind., E. M. Lewis  
Kansas City, Kan., L. N. Wood  
Milwaukee 9, Wis., K. W. Stoffregen  
New York 17, N. Y., V. A. Chern  
Oakland, Calif., Bues Prod. Equip. Co.  
Philadelphia, Pa., Jackson-Walter Co.  
Seattle, Wash., Norwes Company  
St. Louis, Mo., Moehlenpach Engr., Inc.  
Warren, Ohio, P. L. Duer

**KNU-VISE  
PRODUCTS**

**LAPEER MFG. CO.**

**3056 DAVISON ROAD • LAPEER, MICHIGAN**

Western Division, 422 Magnolia Street, Glendale, California

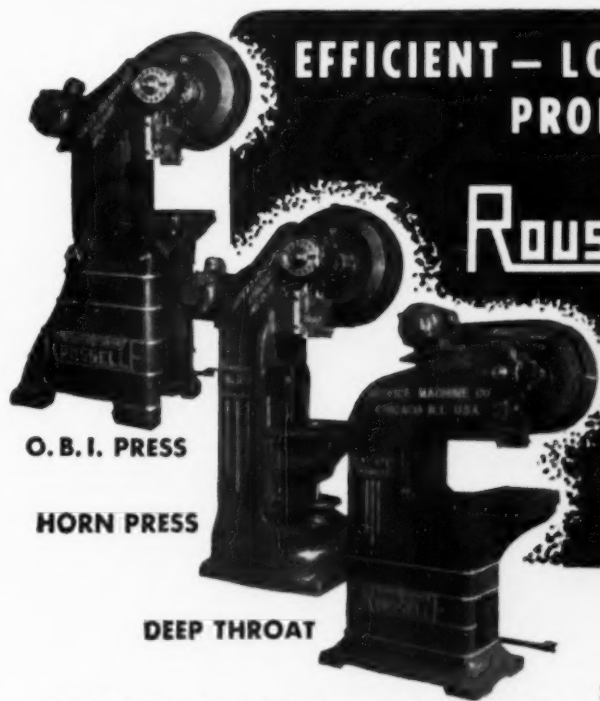
tive Precision Toolmaker's Lathe," which is a 22-minute long film, presents the features responsible for ultra-precision turning, boring, and facing operations in machining typical workpieces. "Inbuilt" precision performance of equipment is clearly demonstrated.

"Mona-Matic Magic" is two films, each having approximately an 18-minute running time and presenting numerous representative, diversified turning operations being performed with the Monarch Mona-Matic Lathe. The films show the unusual versatility of the machine. Part I quickly reviews basic design features and operational principles responsible for the lathe's

performance and then introduces the first of many representative operations. Part II shows, in rapid succession, both typical and unusual examples of work now being handled by the Mona-Matic method of producing a maximum volume of precision parts at minimum cost.

The films are available without obligation to persons writing on their company letterheads direct to the Monarch Machine Tool Co., Sidney, Ohio.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.



**EFFICIENT — LOW COST  
PRODUCTION**

**ROUSSELL**

**PUNCH  
PRESSES**

**WRITE FOR  
DETAILS**

**O. B. I. PRESS**

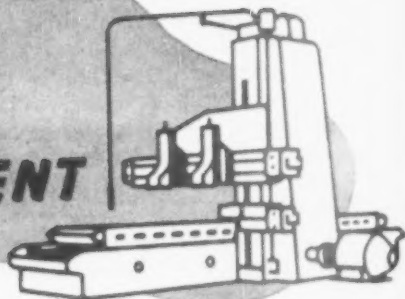
**HORN PRESS**

**DEEP THROAT**

**SERVICE MACHINE COMPANY**

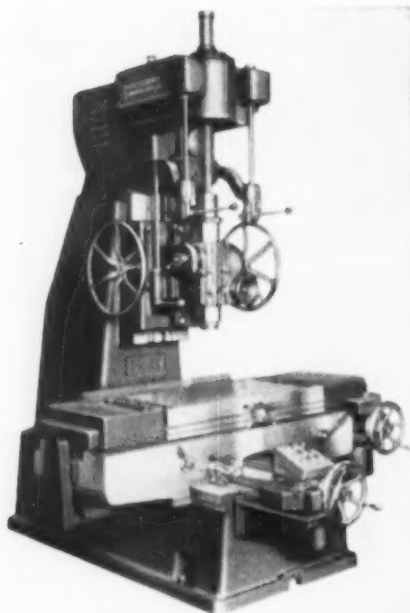
**7633  
S. Ashland Ave.  
Chicago 20**

## NEW SHOP EQUIPMENT



### Jig Borer with Automatic Positioning

Designated as the Model No. 42P, a jig borer with an automatic positioning feature which is designed to minimize the time required for accurately setting the machine table in performing drilling, reaming, boring, and tapping operations



Fostick Model No. 42P Jig Borer with Automatic Positioning

is now being marketed by the Fostick Machine Tool Co., Cincinnati 23, Ohio. When using the positioning device, the rapid traverse to both the table and slide is automatically engaged, and it is also possible to rapid traverse, as well as automatically position, the slide and table simultaneously. A separate micrometer adjusting block which can be used to locate the center of the starting hole is located on the table and slide.

For the automatic positioning of the table and slide, four motors are provided, two for rapid traversing and two for final positioning. After placing measuring rods or a duplicating bar in the trough in front of an indicator, the operator merely pushes the proper positioning button and the rapid traverse motors automatically rapid traverse the table to within  $\frac{1}{16}$  inch of its final position. The rods then strike a micro-switch which breaks the current on the rapid traverse motors and energizes the positioning motors. This action decreases the speed, and in a few seconds the table moves to the final position and stops the positioning motors. After the table has been positioned, the motors reverse, removing the backlash in the nut, and a positioning shaft automatically reverses to release the backlash in the screw. The same operation is duplicated on the slide. The device is said to position the table and slide to within plus or minus 0.0001 inch.

The table working surface of the machine is 22 x 44 inches and has a travel of 18 x 42 inches. The machine has 24 speeds ranging from 30 to 1,500 r.p.m. or any multiple of this speed, and three optional ranges of feeds are available to meet special requirements. The gearbox is equipped with a twin-disc clutch for driving the spindle, and an additional twin-disc clutch is used for a brake.

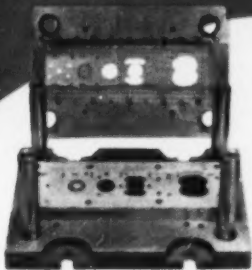
*160 pieces a minute to tolerances  
of less than .0005"!*



These rotor and stator elements  
are stamped in the six station die shown  
below in a 50-ton press at 80 strokes  
per minute. With half thousandth place  
part tolerances, almost perfect die  
alignment is a must! That's why . . .



they built the die in a  
***DANLY PRECISION DIE SET***



Die built by the Sherman Tool & Die  
Co., Charlestown, Massachusetts, for the  
Signal Manufacturing Co., Lynn, Massa-  
chusetts, in a Special Danly Precision Die Set

Danly precision makes  
every Danly Die Set a reliable  
base for the finest die work. They  
save time in the die shop because  
they are square and true . . . they assure  
longer production runs in the press because  
precision closure protects die components.

Standard Danly Die Sets are quickly  
available from a nationwide system of  
completely stocked assembly branches. Just  
phone for fast delivery, and for the finest in  
die set precision, always specify Danly.

**DANLY MACHINE SPECIALTIES, INC.**  
2100 South 52nd Avenue Chicago 30, Illinois

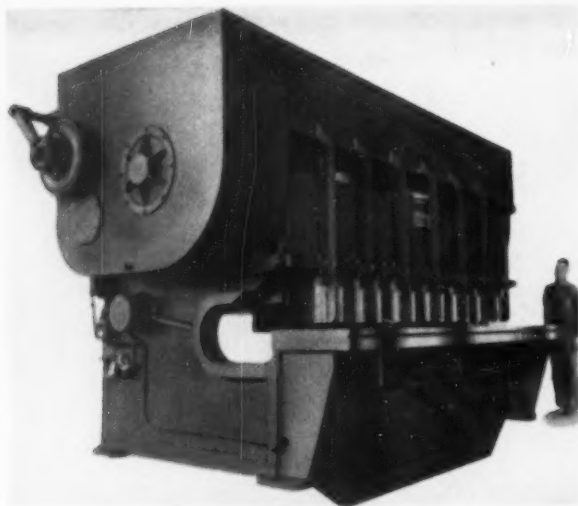


PRECISION DIE SETS . . . STANDARD AND SPECIAL

**DANLY**



Steelweld 12-Foot Capacity Shear



### 12-Foot Shearing Machine

Described as the largest Steelweld Shear built to date by The Cleveland Crane & Engineering Co., 6411 E. 282nd St., Wickliffe, Ohio, the machine shown herewith has a shearing capacity for 12 feet of 1-inch steel plate. The machine has no slides or guides for the knife to work in, since it makes use of a pivoted-blade cutting principle. The upper blade operates on two heavy pins secured to the side frames and travels in a circular path.

An outstanding feature of the machine is the Micro-Speed knife adjustment which enables knife clearance to be quickly and easily changed to suit various thicknesses of plate. The machine is designed to cut at the rate of 25 strokes per minute and is provided with a 24-inch deep throat. Both the frame and blade are of all-welded one-piece steel construction. The frame bed and crown are welded integral with the side frames to assure permanency and provide rigidity and lifetime accuracy. The bed has ball bearing transfers to facilitate the movement of steel through the knives.

Control of the machine is easily effected through use of an electric foot switch that is connected to the shear by a cable to a receptacle at the front. The switch can be moved about the floor to wherever most convenient and is said to require but an easy movement of the toe to operate. To provide for maximum protection, all rotating parts of the machine are located at the rear and out of the way. The

knife and hold-downs are fully protected by a heavy plate-type guard.

### Oil-Hydraulic Pumping Unit

To meet a wide range of fluid power requirements for machine tools and other industrial equipment, The Denison Engineering Co., 1153 Dublin Rd., Columbus 16, Ohio, has announced an oil-hydraulic pumping unit for regulative pressures up to 5,000 p.s.i. Available in 22 models designed to specifications recommended by

the Joint Industry Conference, the unit consists of a reservoir base with all operating components, including pump, relief valve, gages, and electric motor drive, mounted on the removable top cover.

The reservoir of the unit is supplied in capacities of 55, 110, and 165 gallons. It is of welded steel construction and has an access door at the end to simplify tank cleaning. The bottom of the reservoir is above floor level and slopes slightly to facilitate draining.

A choice of three series of Denison hydraulic pumps is offered. These are of the axial piston type and may be for either constant or variable volume. The 600 series pumps deliver up to 9 g.p.m. at 1,800 r.p.m. in a pressure range up to 5,000 p.s.i. Pumps of the 700 series are rated at 20 g.p.m. at 1,200 r.p.m. for requirements up to 5,000 p.s.i. The 800 series provide a maximum 35 g.p.m. at 1,200 r.p.m. for service up to 5,000 p.s.i. The variable volume pumps are available with a choice of handwheel, pressure compensating, stem or cylinder control of oil delivery.

The pump and electric motor are mounted horizontally on the reservoir cover plate and connected by a flexible coupling. Motors supplied with this equipment range from 5 to 75 horsepower ratings, according to requirements of service.

Accurate adjustment of pressure within desired ranges up to 5,000 p.s.i. can be made with the relief valve, which is the Denison threaded body type. A knurled

PRECISION MADE BY THE WORLD'S GREATEST MAKERS OF PRECISION TOOLS

TRADE MARK REG. U. S. PAT. OFF.

# Starrett

## HACKSAWS

**"SM" MOLYBDENUM M2  
HIGH SPEED STEEL**

For high speed, low cost cutting of  
tough metals

New Standard Unit Packaging  
100 Hand Blades in a Box  
10 Power Blades in a Box



## BAND SAWS

Packaged in new, handy 100 foot reel dispensers  
and 250 or 500 foot pull out safety cartons. Also  
cut to length and welded.



Write for complete Starrett  
HackSaw and Band Saw Catalog MD

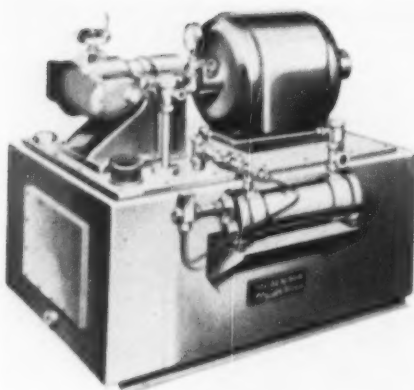
# Starrett

Standard of Precision

MECHANICS' HAND MEASURING TOOLS AND PRECISION  
INSTRUMENTS - DIAL INDICATORS - STEEL TAPES - HACKSAWS  
AND BAND SAWS - PRECISION GROUND FLAT STOCK

Buy Through Your Distributor

**THE L. S. STARRETT CO.** • World's Greatest Toolmakers • **ATHOL, MASSACHUSETTS, U. S. A.**



Denison High-Pressure Oil-Hydraulic Pumping Unit

adjustment knob is provided on the valve cap. A pressure gage and gage shutoff valve are connected directly to the relief valve and used for initial setting of system pressures.

Optional equipment is available to further extend the versatility of the pumping unit, including a heat exchanger attachment for cooling oil in the hydraulic system, and a vacuum gage to permit easy checking of the condition of the oil filter within the reservoir at any time.

### Casting Alloy

The Chambersburg Engineering Co., Chambersburg, Pa., is now producing large and small castings of Ductile Cocolloy for component parts of many Chambersburg products and is also marketing the material in the heavy jobbing casting field. Basically, the material is a high-carbon cast iron, treated with magnesium to transform the graphite from the normal flake form to spheroidal form, thus retaining self-lubricating properties and much of the vibration-dampening properties of cast iron while virtually eliminating weakness resulting from the notch effect of flake graphite. The metallic matrix of the material is essentially steel, which can be produced with appropriate microstructures to provide desired physical properties. It is also subject to heat treatment for improvement of physical properties.

Ductile Cocolloy can be produced to specifications within the ranges of the following physical properties as cast: tensile strength, 60,000 to 80,000 p.s.i.;

yield strength, 40,000 to 60,000 p.s.i.; elongation, 0 to 15 per cent; modulus of elasticity, 22,000,000 to 25,000,000 lb. per square inch.

### Carbide Tool Grinder

A bench-type universal carbide tool grinder designed especially for use with diamond wheels of all types has been announced by the Wickman Mfg. Co., 15533 Woodrow Wilson Ave., Detroit 3, Mich. It can be used as a surface grinder, a chip breaker grinder, and a universal tool and cutter grinder.

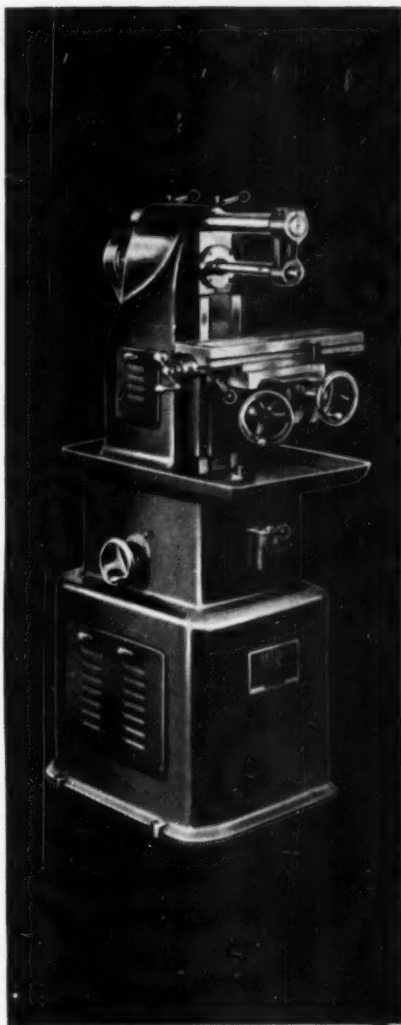
The machine is provided with both a swiveling table and swiveling motor with micro-setting scales for accurate grinding and resharping of cutters, reamers, counterbores, and so on. It is powered with a special 2,850 r.p.m., 1 h.p. reversing motor which is said to be completely free of any vibration during operation. The motor can be reversed by a lever switch on top as many as 70 times a minute without harming the windings.

Grinding wheels are mounted directly on the 1½-inch ball bearing spindle or on either of two adapters which provide spindle extensions of 2½ and 5½ inches. The motor and wheel can be accurately set in any position 20 degrees either side of vertical center.

A lever and handwheels at the front of

Wickman Bench-Type Universal Carbide Tool Grinder





**Available Accessories  
and Attachments**

Power Feed	Universal Head
Dividing Head	Coolant System
Rotary Table	Swivel Vise
Drip Pot Oiler	

## The Logical First Milling Machine

When you decide to buy your first Milling Machine, make it a Sheldon. This moderate price machine tool can be bought as a basic machine . . . power feeds, universal heads, etc. can then be added as needed.

Sheldon Milling Machines are rigidly built for continuous, precision service. The spindle is supported in double row Timken Taper Roller Bearings. Fully enclosed variable drive, spindle range 100 to 1100 r.p.m. (with back gear attachment speeds from 25 r.p.m., up). Tapered gibs throughout.

*Write for complete Catalog which  
includes specifications and  
attachments*

# SHELDON

## CHICAGO

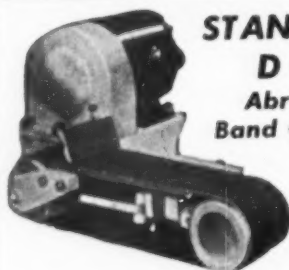
**SHELDON MACHINE CO., Inc.**

4250 N. KNOX AVENUE  
CHICAGO 41, ILLINOIS, U.S.A.

the machine provide for vertical, longitudinal, and transverse table movement. Micro-scales are incorporated for close settings, and the table has two T-slots for adjustable stops.

Coolant is supplied by a centrifugal type pump which delivers 12 gallons per hour. Two coolant adapters are used; one for grinding and one for cutting off and chip breaker grinding. A reservoir with 11½-gallon capacity is built into the base of the machine.

The grinder measures 31¾ inches high and requires a floor space of 30 x 30 inches. The table is 17 x 5 inches in size.



### STANDARD D - 4 Abrasive Band Grinder

Famous  
for  
Stamina

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36¼" band. The ideal portable unit.

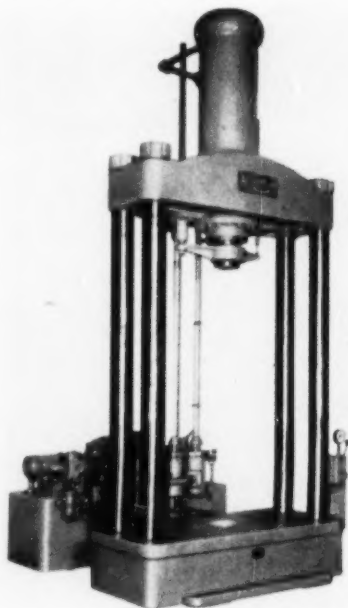
OTHER STYLES AND SIZES IN NEW  
MANUAL ON FINISHING—WRITE TODAY

## WALLS SALES CORP.

306 E. 38th St., New York 16, N. Y.

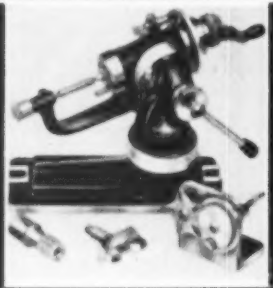
## Hydraulic Forcing Press

A maximum ram speed of 275 inches per minute is an outstanding feature of the four-post 150-ton hydraulic forcing



Hannifin 150-ton Hydraulic Forcing Press

press illustrated herewith, product of the Hannifin Corp., 1136 S. Kilbourn Ave., Chicago 24, Ill. Intended primarily for the press-fit assembly of shafts to armatures and rotors, the machine has an 82-inch gap (ram up) and a 48-inch maximum stroke. There are 60 inches of space between columns left to right and 10 inches front to back. The table, which is



## New "ALL TOOL" Cost Reducing

Precision Compound Angle Collet Index Fixture  
for Grinding, Milling, Drilling, Etc.

### FEATURES . . .

- Swivels 360° in three planes. • Flat, radius and cylindrical grinding in one setting. • Center attachment adjustable and removable. • 1" standard collet capacity. • Dividing head can be set for any division.

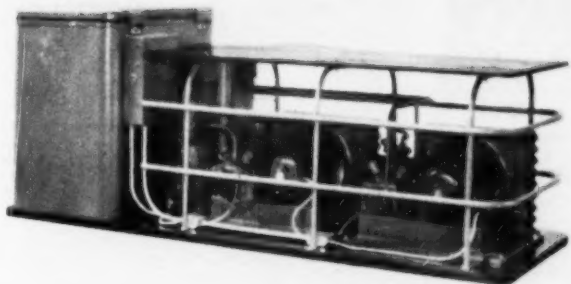
Replaces cylindrical grinder on small parts.

### EASTERN MACHINE & TOOL CO.

170 Broadway

Dept. MMS

New York 7, N. Y.



Deepfreeze Model No. R-120  
Sub-Zero Industrial Chilling  
Machine

that required to accommodate the work, the press can be easily adapted to a wide range of press-fit assembly applications, as well as other work.

### Sub-Zero Industrial Chilling Machine

36 inches deep front to back, is 18 inches above the floor and has a 10-inch hole in its center to allow shafts to extend through the table. The ram is guided to prevent rotation if a fixture is used.

The press incorporates a sensitive pressure control which allows the operator to vary the amount of pressure applied by a single hand lever. When a uniform pressure is to be applied repetitively, a stop is provided to limit the travel of the control lever. The predetermined pressure thus obtained can be varied from 15 to 150 tons. Since up-travel can be limited to

Designated as the Model No. R-120, a sub-zero industrial chilling machine for high production chilling of metal parts where large quantities of heat must be removed quickly has been developed by the Deepfreeze Distributing Corp., 3932 Reading Rd., Cincinnati 29, Ohio. The unit has a thermal capacity of 2,000 B.T.U.'s per hour at all temperatures from 0 to minus 120 deg. F., when the work is immersed in a convection fluid in the chilling chamber. This is equal to 16 lb. of dry ice per hour at 91 deg. F. below zero under similar conditions. The chamber, which is 18

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## AIR ARBOR PRESSES

*Air or Spring Return*

**1/4 TON    1/2 TON    3/4 TON    1 TON**

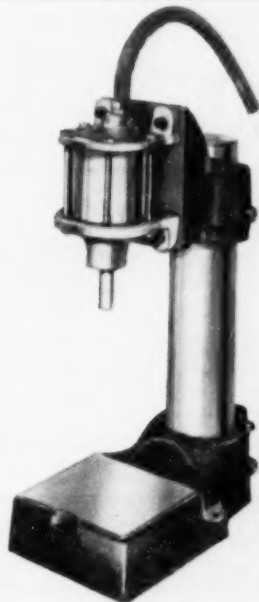
**For Staking, Riveting, Marking, Punching**

**A** PRACTICAL range of sizes adaptable to an almost unlimited variety of uses in shop or factory. Air pressure can be regulated to give uniform pressure on each application... "just enough" effort to do the job without the danger of damage to the work, or the variations that may result from uncontrolled human effort.

*Ask for new catalog of Air-Mite Arbor Presses and complete line of single and double acting Air Cylinders.*

**AIR-MITE**

**2651-G West Lake St.  
CHICAGO 12, ILL.**





inches wide x 30 inches long x 33 inches deep, provides freezing surfaces of over 22 square feet and a capacity in excess of 75 gallons or about 10 cubic feet. The chamber is lined with approximately 4 inches of Santocel insulation to provide for maximum efficiency.

Compact and sturdily constructed, the machine is equipped with  $\frac{3}{4}$  and 1 h.p. 220-volt single-phase motors, two compressors, and an adjustable temperature control. The shipping weight of the unit is 1,500 pounds.

## Hole-Positioning Device

For fast and accurate hole-positioning, the Benzon Machine Co., 7th & Washington Ave., Lansdale, Pa., has brought out the "Coordinator" (Fig. 1), an attachment for vertical boring machines, vertical milling machines, horizontal boring machines, and other machine tools, which is designed to locate a pattern of holes and reproduce the pattern as often as desired through the use of preformed records cut on cylinders. The attachment does not affect the normal operation of the machine tool and will compensate for errors

in the pitch of traverse screws and racks in applications where the errors are beyond required tolerances.

Claimed to expedite small-lot production, ensure accurate work and accurate reproduction, and reduce operator fatigue and operator errors, the Coordinator utilizes the ordinate system of hole location in which ordinates dimensioned from two perpendicular base lines are combined, the ordinates locating the centers of holes to be machined. The ordinates combined in the Coordinator are first recorded on cylindrical records known as Micro-Patterns. The recordings are cut on a small portable machine called a "Recorder," as illustrated in Fig. 2.

Two Micro-Patterns are cut for each Coordinator. One is mounted on a slow-turning spindle support and controls, through a yellow light the movement of work to within less than 0.100 inch. This Micro-Pattern

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## SHIM STOCK

Buy it in the Laminated Shim Company's handy dispensing cartons and racks. It's ready for use, with no waste because of inadequate storage and fumbling with bulky sheets. Just pull the length you want out of package slot and snip it off.

## ARBOR SPACERS

in moisture-resistant envelopes



Seven standard sizes, with or without keyway. Eight different thicknesses from .001 to .020 inch.



## LAMINATED SHIM COMPANY, Inc.

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Glenbrook, Connecticut



SHIMS



SHIM STOCK



STAMPINGS



ARBOR-LOX NUTS

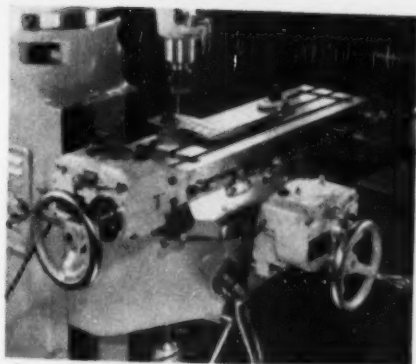


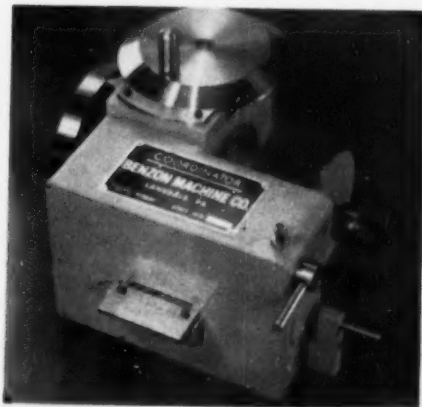
Fig. 1—Benzon "Coordinator" Installed on a Machine Tool

makes one revolution per 10-inch traverse of work. The second Micro-Pattern makes one revolution per 0.100 inch of work travel, supplements the first record, and controls a red light to close limits.

Each record blank has 16 complete rings on its outer surface and each of these rings is cut to measure an ordinate. On the Red Coordinator (red top plate) the rings are numbered 0 to 15, and on the Blue Coordinator (blue top plate) the rings are designated alphabetically. The record blanks are placed in the Recorder and clamped, the dials set to zero, and the base line position recorded by making one-half turn of the knob at the right-hand side of the Recorder. After each recording, the dials are set to the next ordinate dimensions.

Micro-Pattern blanks are made from a

Fig. 2—"Recorder" Used for Cutting Micro-Patterns



June, 1950

**IT'S  
FAR SUPERIOR**  
**COMPARISON PROVES IT**



**DON'T BUY ANY AIR  
GRINDER UNTIL YOU'VE GOT  
THE FACTS ABOUT THE "M-B"**

**SUPER-SPEED Pneumatic  
GRINDER**

**Model SS-SR**

**A 100,000 R.P.M. UNIT**

The only hand grinder with spindle speed of 100,000 R.P.M. on 100 pounds of air pressure. It has revolutionized hand grinder performance. Can be directed in any working position; operates with extreme ease. Steel construction throughout. Formed to fit the hand. Weighs only 14 ounces. Write for Literature.

Also Other Grinders and Automatic Air-line Filters, Regulators and Lubricators.

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Long After First-Cost Disappears"*

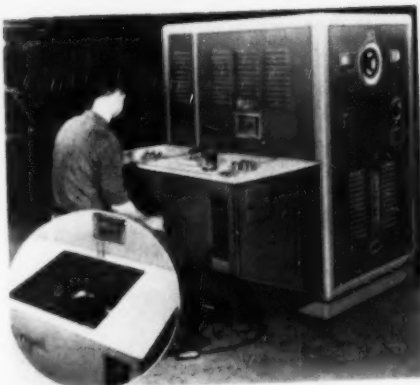
Representatives in Principal Cities

**M·B PRODUCTS**  
130-134 E. LARNED ST.  
DETROIT 26, MICHIGAN

synthetic resinoid plastic with low factors of change from atmospheric variations. If desired, Micro-Patterns can be stored and used for repeat orders.

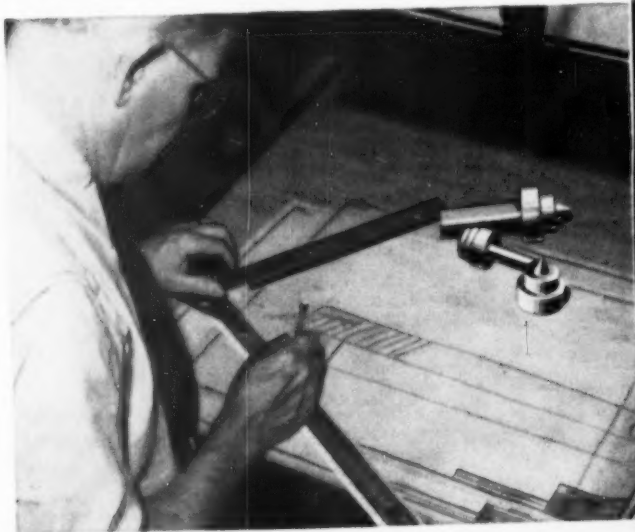
### Combination Work Table and Quench Tank

A combination work table and quench tank that can easily be attached to vacuum tube or spark gap converters has been designed by the Lepel High Frequency Laboratories, Inc., 39 W. 60th St., New York 23, N. Y. With a sink cover attached, the combination unit forms a handy work table, 29 x 56 inches, for mounting work coils and fixtures. The center portion of the table-top may be removed, uncovering a brass or stainless steel quench tank 24 x 24 x 18 inches deep which is fed by a 1-inch water line which is solenoid controlled. The sink can be used for water, oil, or brine quenching and will accommodate the Lepel Roto Heating and Quenching Unit, designed for the hardening of gears, blanks, and so on. Heating and quenching cycles are controlled by a timer operated by push-button or foot-switch control.



Lepel Combination Work Table and Quench Tank in Use

The table, constructed from structural steel, is provided with a heat-resistant top and is attractively finished in two-tone gray to match the high frequency converters. The table is also available as a work table only, without the quench tank, timer, and solenoid valve features.



**Engineered Live Centers . .** A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.

**STURDIMATIC  
TOOL COMPANY**

3904 F STREET • DETROIT 16, MICH

## Medium-Weight Drilling Machine

Designated as the Model E-25, a medium-weight drilling machine with 25-inch swing has been introduced by Sibley Machine & Foundry Corp., 31 E. Tutt St., South Bend 23, Ind. The machine weighs 765 lb. and includes a variable speed drive from which the exact spindle speed may be obtained for any size drill from  $\frac{1}{8}$  to 1 inch. Additional features include an extra large rectangular 18 x 26-inch table with coolant



Sibley Model E-25 Drilling Machine

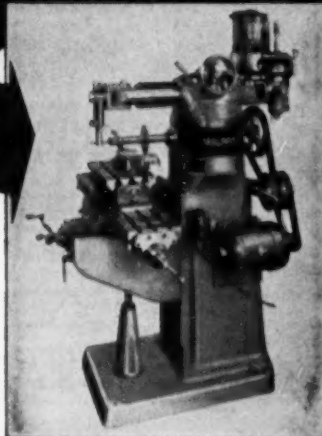
trough; full-floating ball bearing spindle with maximum travel of 8 inches; and  $4\frac{1}{2}$ -inch diameter solid column.

Powered by a  $1\frac{1}{2}$  h.p. axial air gap type motor, the machine has a rated capacity of  $\frac{3}{4}$  inch in steel and 1 inch in cast iron. A wide range of spindle speeds is quickly and easily obtained by means of a self-locking speed control located conveniently to the operator. A tachometer on the front of the machine provides an accurate reading of speeds. Five options of spindle speeds, each with a 4 to 1 ratio, are available, ranging from a low of 206-825 r.p.m. to a high of 540-2,160 r.p.m. with a 3-phase 60-cycle motor. A chart on the side of the machine shows the proper speeds for different sizes of drills.

June, 1950

## MALNAR MAKES YOUR BRIDGEPORT

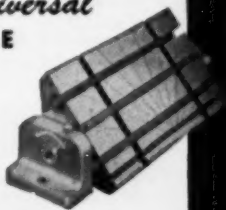
*Universal*  
NO MORE RESETTING  
WORK VERTICAL OR HORIZONTAL



Greater output, profits. No time lost. No resetting errors. Changes instantly from vertical to horizontal work. Sturdy Timken bearing spindle — speed ratio 15 to 1. Variable speed transmission. Fits your Bridgeport. Write us today.

### MALNAR *Universal* WORK TABLE

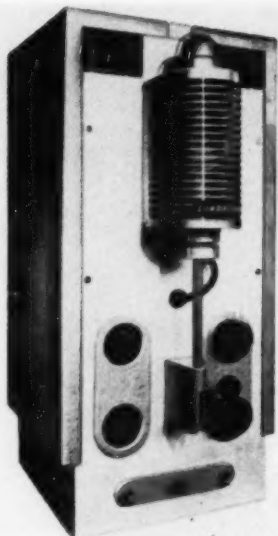
Tilts work  $45^\circ$  either direction. Quickly fastens on any milling machine. Speeds work. Cuts job costs.



**MALNAR**  
MACHINE & TOOL CO., INC.  
19301 ST. CLAIR AVE. • CLEVELAND 10, OHIO

## High Frequency Combustion Unit

For the ignition of iron and steel samples in carbon and sulphur determinations, the Lindberg Engineering Co., 2469 W. Hubbard St., Chicago 12, Ill., is offering the high frequency combustion unit shown herewith, which can be operated at temperatures exceeding 3,000 deg. F. The unit includes a short vertical glass combustion tube surrounded by an air-cooled coil to which radio frequency energy is supplied by a vacuum tube oscillator. The conventional boat is replaced by a high refractory "cupelet" developed specifically to withstand the thermal



Lindberg "H-F" Combustion Unit



### GRAY TURRET HEAD METAL CUTTER OR NIBBLER

**N.A.M.** Pioneer Award  
Given to Gray

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

**GRAY MACHINE CO.**

Box 596, Philadelphia, Pa.

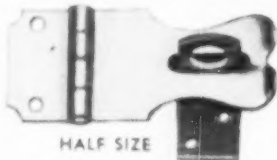
... for more than  
**1001 jobs**



**HJORTH LATHE & TOOL CO.**  
8 BEACON STREET WOBURN, MASS.

shock produced during the combustion cycle. Oxygen is introduced through integral piping, and the flow is regulated by control valves situated on the front panel.

Atmosphere seals are provided by aluminum breech connectors in conjunction with synthetic rubber O-rings which are located completely outside of the heated zone. The loading and sealing operation is performed by a vertical bolt-action mechanism. The relative position of the coil and crucible is established by an adjustable pedestal supporting a ceramic hearth. The Lindberg "H-F" Combustion Unit is 28½ inches high x 13½ inches wide x 17 inches deep and is designed for operation on 115 volts, 60-cycle single-phase current.



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4725-4735 IOWA ST.

DEPT. M

CHICAGO 51, ILLINOIS



## Magnetic Coolant Separator

The Barnes Drill Co., 860 Chestnut St., Rockford, Ill., has announced a midget magnetic coolant separator designated as



"Barnesdril" No. 00 Magnetic Coolant Separator

the "Barnesdril" No. 00, which has a capacity of  $1\frac{1}{2}$  g.p.m. and is intended primarily for use with small honing, grinding and threading machines. Designed for mounting on the side of the machine or inside the coolant storage tank to receive the coolant as it flows from the work,

the separator removes metal particles and fused abrasive from the coolant, providing a uniform, clean coolant supply.

The flow of the coolant is through a restricted area between the separator housing and a cylindrical drum carrying a number of permanent magnets. The drum rotates in the opposite direction to the coolant flow and the metal particles in the coolant are drawn by the magnetic field to the drum shell and held there until an automatic scraper removes the particles and deposits them into a removable container. After passing through the restricted area, the coolant flows from the separator into the clean coolant compartment of the machine.

## Oil-Hydraulic Press

An air-operated oil-hydraulic press equipped with an eight-station air-operated automatic dial index table has been announced by Hy-Air Products Co., Probert Rd., Jackson, Mich. Automatic cycling is accomplished by energizing an automatic reset timer with a manually-operated momentary contact switch on the timer. This starts the timer and the downstroke of the press ram. When the

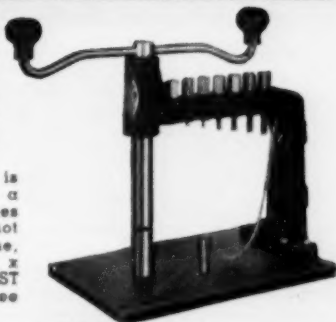


## The Quick, Easy, Handy Way to TAP BY HAND

### ... Adapts for LATHE USE

THE DAHLSTROM TAP GUIDE virtually eliminates tap breakage—and saves those costly hours spent prying broken taps out of dies. Saves time, too. Just a few turns of the handle and the job is done.

Winds through continuously, with no backoff. Work is always dependably straight and square. Fasten it to a post or set it on top of a big job. This handy tapper comes equipped with 9 adaptors, 8-32 to  $\frac{1}{4}$ " but taps are not furnished. Spindle can be pulled out and used in a lathe, or used as tap extension for hard-to-get-at places. 13" x 8" x 14", wt. 32 lbs. DAHLSTROM MFG. CO., 2522 WEST LARPEUR AVE., ST. PAUL 8, MINN. Send for Free Circular.



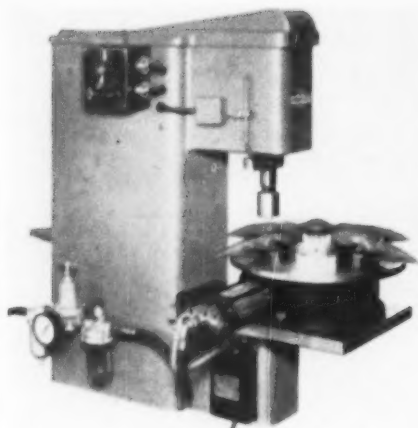
Also Makers of Dahlstrom Autostop and Tap Chuck

# Dahlstrom TAP GUIDE

**\$52.50**

F.O.B. St. Paul





Hapco Air-Operated Oil-Hydraulic Press

preset time has elapsed, the timer de-energizes the solenoid valve controlling the ram and the ram begins its return stroke. At the top of the stroke a one-way dog trips a microswitch connected to the advance side of the index table cylinder,

causing the table to advance to the next position. When the next position is reached, a microswitch on the table is tripped, restarting the timer and beginning the next cycle.

The time for the cycle can be quickly and accurately adjusted by a moving pointer on the timer dial for cycles of one to 60 seconds. The electrical circuit is provided with a master switch which can be operated either by hand or foot. Automatic ejection of parts can be effected either mechanically or with exhaust air. Stripping is easily provided for since the ram has full power on the return stroke.

The press is made in 2½ and 5-ton models with stroke of 2 or 5 inches. Pressure, stroke, and speed of the ram are easily and quickly adjustable. Standard "O" rings are used throughout. Besides the eight-station index table, 4, 6, 12 or 24-position tables also are available and can be furnished with or without complete tooling.

### Redesigned Broaching Machines

The Colonial Broach Co., Box 37, Harper Station, Detroit 13, Mich., has announced that its broaching machines, including single and dual ram surface

#### 4 MODELS

"Junior"—18 ga. mild  
B1 for 14 ga. mild  
B2 for 10 ga. mild  
B3 for 3/16 ga. mild

**Beverly THROATLESS SHEAR**

*Cut any Shape...* **STRAIGHT OR  
IRREGULAR**



Write for  
illustrated circular

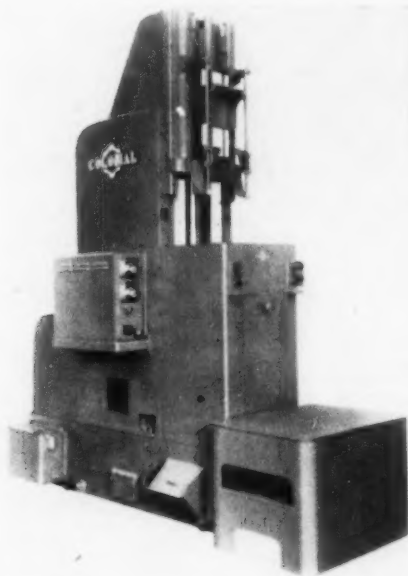
**B-3**  
With  
Ball Bearing  
Hold Down

You can make straight or intricate cuts in the lightest metals without distortion, yet handle heavier gauges with ease on a Beverly — "the Shear that experience built and performance made." Smooth, powerful, clean-cutting action of the Beverly has made it the preferred shear wherever metal is cut. Ask your Dealer to show you these superior metal cutting tools . . . or write for more details and illustrated circular.

Made in 4 sizes to handle 18 ga., 14 ga., 10 ga., and 3/16" mild steel. H.C.H.C. blades available for cutting stainless steel.

**BEVERLY SHEAR MFG. CO.**  
3000 W. 111TH STREET CHICAGO 43

broaching machines and pull-up and pull-down internal broaching machines, have been redesigned to conform to the new standards of the Joint Industry Conference. All electric controls are group mounted in a single external dust protected panel. All hydraulic controls are similarly group mounted outside of the machine on a panel on the opposite side of the column. Motorized pumps are so located that they can be changed in a matter of approximately one hour's time.



Colonial Redesigned Broaching Machine with Group-Mounted Standardized Controls

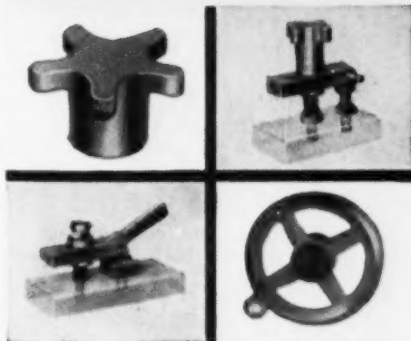
The filters employed consist of individually replaceable cartridges that are externally accessible and replaceable as are hydraulic control valves, without draining the system of the machine.

The various units of the electric and hydraulic controls of each machine have been standardized for interchangeability and ease of maintenance and service. The location and arrangement of these standardized units make it easier than formerly to incorporate almost any desired type of automation in the machines, interlocked with the machine cycle. This includes automatic clamping and unclamping, loading and unloading, automatic indexing or magazine feeding, and interlock with other machines for transfer operations.

June, 1950

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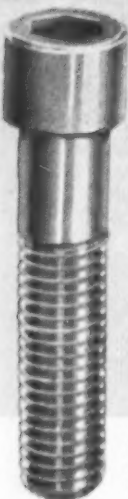


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"Get More with Morton"  
**FIXTURE CLAMPS**  
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Fixture Details

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**A new high  
in socket  
screw  
perfection**



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**Quality**  
STATISTICALLY  
CONTROLLED

**B-RIGHT-ON**  
SOCKET SCREW PRODUCTS

Just two words tell the whole story! Brighton's Nu-Process and UNI-QUALITY mean tops in socket screw products . . . set screws, cap screws, stripper bolts and pipe plugs.

They're NU-PROCESS . . . specially selected alloy steel is formed by Brighton's Nu-Process into screws with continuous unbroken fibers and fine, compact grain. Carefully heat-treated under electronic control for a perfect balance of hardness and strength.

They're UNI-QUALITY . . . each and every screw perfect for concentricity, thread-body-socket sizes, flat and uniform faces and smoothly formed points. Quality is statistically controlled.

Whether you use "standards" or "specials" or both, you can be sure of getting the best when you specify UNI-QUALITY, NU-PROCESS B-Right-On Socket Screws from your Industrial Distributor.



For full details, send for your free copy of New Catalog.

**BRIGHTON**

Screw & Mfg. Company

Reading Rd. at Dorchester  
Cincinnati 2, Ohio

## Double Spindle Disc Grinder

A double spindle disc grinder for the high production grinding of parallel surfaces of ball-bearing races, thrust

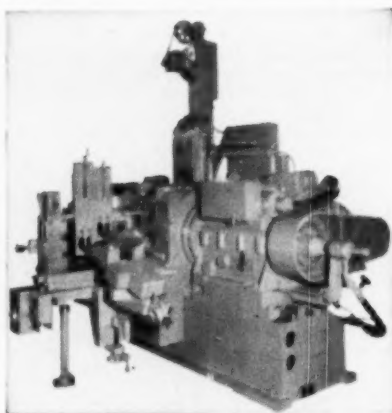


Fig. 1—Besly Double Spindle Disc Grinder

washers, seal plates, and other similar parts has been developed by Charles H. Besly & Co., 118-124 N. Clinton St., Chicago 6, Ill. The machine (Fig. 1) is equipped with a bar-type truing device arranged for truing the abrasive members with either diamonds or ball-bearing

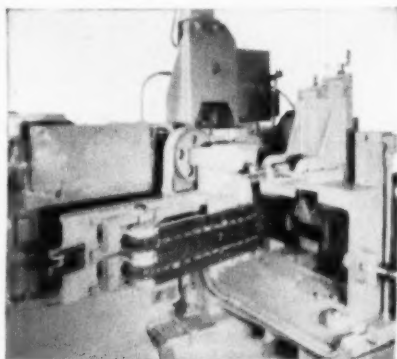


Fig. 2—Close-Up View of Grinder Showing Power-Driven Continuous-Chain Type Feeding Fixture

type star cutters, and has 30 h.p. motors with V-belt drive to two grinding spindles which are equipped with super-precision

bearings and carry 30-inch disc type abrasive wheels.

A power-driven continuous-chain type feeding fixture (Fig. 2) with two continuous chains containing equally spaced drive lugs conveys the work between the abrasive members as it is received from the two magazine loading fixtures. The latter are equipped with a vibrating device to assure a continuous flow of parts to the feeder at high operating speeds. The size of the finished parts is controlled by a fixed tungsten carbide anvil and a reed-mounted movable tungsten carbide anvil which actuates an air jet connected with a Sheffield Airlectric gaging head. This gaging device actuates the feeding mechanism of the grinding wheels to control size.

Designed to produce a maximum of 30,000 ball-bearing races per hour, the machine is said to handle work from  $\frac{3}{8}$  to  $9\frac{1}{2}$  inches in diameter and from  $\frac{1}{8}$  to  $\frac{1}{4}$  inch in width.

### Rotary Files, End Mills and Reamers

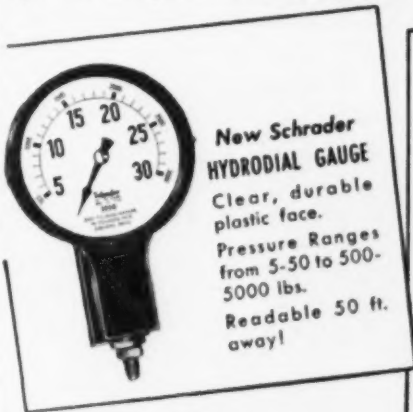
The Charles L. Jarvis Co., Middletown, Conn., has announced the addition of precision machine-ground tungsten carbide rotary files and ground-from-the-solid carbide end mills and reamers to its power tool line. All tools are made of tungsten carbide to provide for unusually long life with a minimum amount of regrinding.

The rotary files are machine ground to exact,

predetermined shapes to provide true running qualities. The solid carbide mills, available in sizes up to  $\frac{1}{2}$ -inch shank diameter, afford maximum rigidity during operation. The solid carbide reamers are precision ground with an odd number of flutes to oppose a crushing load on the cutting edges and are designed to ream to unusually close tolerances, thus producing accurately round holes. Each reamer has a radius ground at the front end which eliminates possible break down of the corner, the manufacturer states.

## These HYDRAULIC GAUGES can TAKE A BEATING

Where a hydraulic gauge has to lead a tough life, insist on Schrader. These rugged hydraulic gauges withstand shock and overload without losing their efficiency because they're built on the Schrader Direct Action Principle and incorporate a built-in snubber.



**For Long Life and Easy Maintenance Always Specify Schrader**

Write for complete information and literature about Schrader Hydraulic Gauges. For information about hundreds of other Schrader Air Control Products... Air Filters, Air Cylinders and Valves, Press Controls etc., ask for 72-Page Catalog.

### STANDARD GAUGES



Pressure ranges 5-50 to 1500-5000 lbs.

## A. SCHRADER'S SON

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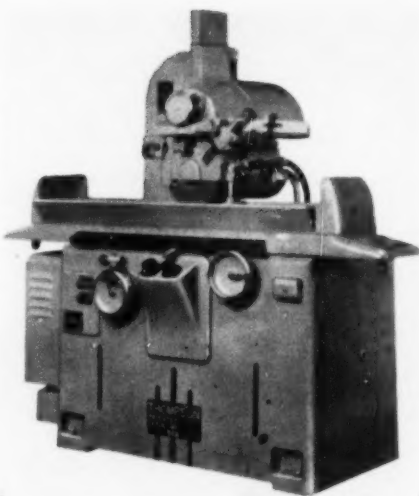
Division of Scovill Manufacturing Company, Incorporated

**Schrader**

## Toolroom Grinder

The Thompson Grinder Co., Springfield, Ohio, has announced a super precision toolroom grinder in an 8 x 10 x 24-inch size. Designated as the type 2F, the machine has a horizontal grinding wheel spindle and reciprocating work table grinding with the periphery of the wheel. Capacity for longitudinal work is 24 inches.

The spindle is of heat-treated alloy steel and is mounted in No. 209 super precision preloaded ball bearings. The wheel is 12 inches in diameter x  $\frac{3}{4}$ -inch face x 3-inch bore. The machine has a 3600/1800



Thompson Type 2F Toolroom Grinder

## Granite Surface Plates

**Durable • Accurate • Economical**

The inherent hardness and durability of granite accurately finished to a guaranteed tolerance of .00005", provide the most efficient and economical surface plates for precision measurement operations. Sizes up to 8' x 16'.

★ **Non-Magnetic** ★ **Can Not Warp**  
★ **Corrosion-proof**

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**THE HERMAN STONE COMPANY**  
324 Harries Bldg. • Dayton 2, Ohio

## READING BENCH KEYSEATER

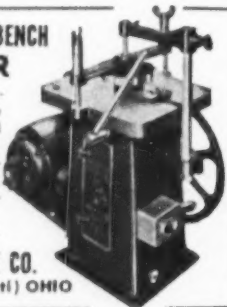
Portable — move directly to job; a time saver for both small and large shops.

3 1/4" stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.

**READING MACHINE CO.**  
READING (Cincinnati) OHIO



## Now! THE AUTOMATIC ANGLE TANGENT TO RADIUS DRESSER

**That Eliminates Breaks in Profile at Points of Tangency.  
NO TEMPLATES OR CRUSHER ROLLS REQUIRED!**

The Jeon Dresser will dress a radius either concave or convex, with angles absolutely tangent on either or both sides of the arc, IN ONE CONTINUOUS OPERATION. Also, any combination of angles or arcs. Write for Price and Folder. Dealers' Inquiries Invited

**JEON MANUFACTURING COMPANY**

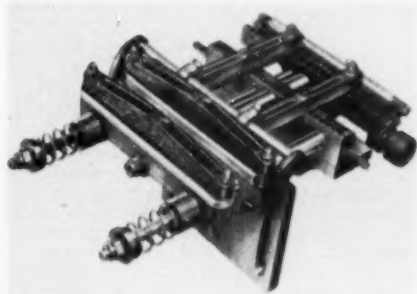
Post Office Box 6750

Washington 20, D. C.



## Improved Automatic Air Feed

Several improvements in the design of its "Feedmaster" Automatic Air Feed which allow for feeding coiled or strip



"Feedmaster" Improved Automatic Air Feed

stock of almost any size and shape up to 18 inches wide and up to a 12-inch stroke have been announced by Great Western Tools, Inc., 3811 Riverside Drive, Burbank, Calif. The feed is constructed for operation on punch presses, spot welders, drill presses, and so on, with all move-

ments pneumatically controlled. An air-actuated feed head pulls the material through the machine, and a hold head, also actuated by air, holds the material while the feed head returns to the reload position. To ensure positive movement of the stock, the gripping capacity of the improved feed head has been increased, and springs have been added on the bar supports to absorb shock load. With the new design the hold head, which always operates in a fixed position, is now securely clamped to the bar supports, thus providing for greater rigidity and a minimum amount of movement.

The improved feed is said to operate at over 200 strokes per minute with accuracy, and can be used with plain, compound, or progressive dies.

## Safety Shield

The Junkin Safety Appliance Co., Inc., 930 W. Hill St., Louisville 8, Ky., has announced the development of the "Electro-Lock" Shield for grinders which is designed to serve as both an illuminating safety shield for eye and face protection and a machine control that prevents the grinder from being started when the movable shatterproof glass

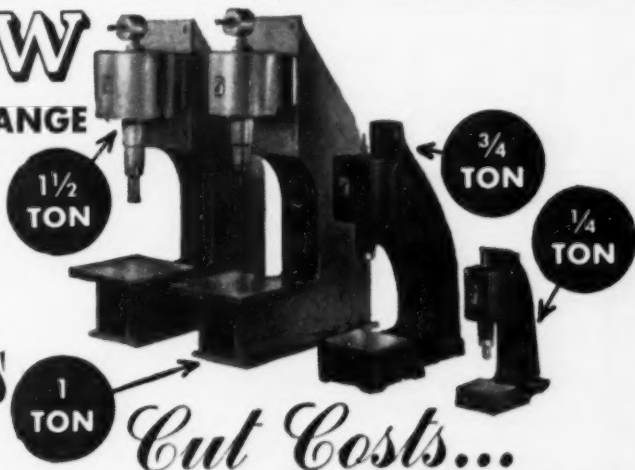
# NOW

## A WIDE RANGE

### OF

### Air

## Presses



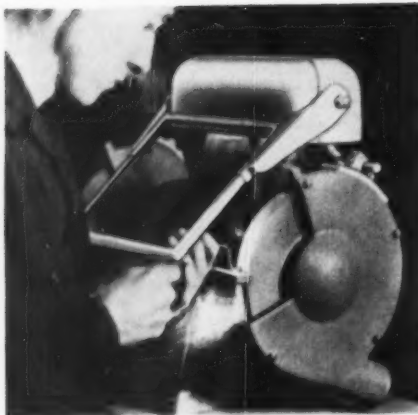
These presses deliver from 4 to 28 times the air line pressure, cost from \$27.50 to \$135.00, and will pay for themselves many times over in faster,

**MEAD SPECIALTIES COMPANY,**

more uniform production on light staking, crimping, assembling jobs. Write for new catalog of air cylinders and other air-operated devices.

4114 No. Knox Ave., Dept. AA-60, Chicago 41





Junkin "Electro-Lock" Shield in Use

safety shield is not in a completely protective position. Features of the shield include convex "bulls-eye" lenses which focus the lights of the shield directly on the points of operation. Mercury switches control both electrical circuits to the two lights and the starting switch.

## REID SURFACE GRINDERS

10,000 IN USE

THEY HAD TO BE  
GOOD TO BE SO  
FAVORABLY KNOWN  
FOR SO LONG

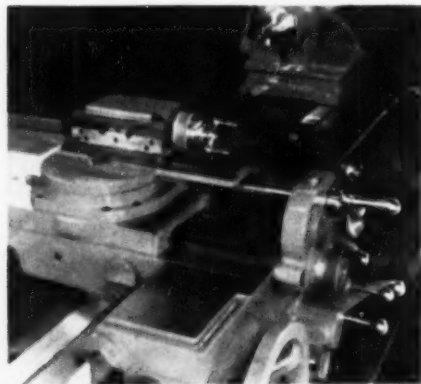
Established 50 Years

REID BROTHERS CO., INC.  
BEVERLY • MASSACHUSETTS

Designed for easy movement to the position best suited for the individual operator, the Electro-Lock Shield once installed becomes an integral part of the grinder and must be in a completely protective position before the operator can start his work. The shield is available for use on both 110 and 220-volt circuits.

### Improved Ball Turning Rest

A ball turning rest of improved design that is said to contribute to more efficient performance and smoother operation of Monarch 14, 16 and 20-inch Series 60 Engine and Toolmaker's Lathes has been announced by The Monarch Machine Tool Co., Sidney, Ohio. The regular bottom slide may be positioned either on center for ball turning or boring, or out of alignment with the spindle center for spherical radius turning. A micrometer



Setup for Boring a Ball (or Socket) on Monarch Series 60 Engine or Toolmaker's Lathe, Incorporating Ball Turning Rest of Improved Design

dial is provided to adjust the bottom slide in or out. Diameter of the ball or radius being turned also can be controlled accurately by means of a similar micrometer adjustment.

With the ball turning rest, a 4-inch diameter ball can be turned on the 14-inch Monarch Series 60 Engine or Toolmaker's Lathe, a 5½-inch diameter ball on the 16-inch machine, and a 6-inch diameter ball on the 20-inch unit. When equipped with a 1-inch raise, the 16-inch lathe is capable of turning a 7½-inch diameter ball.

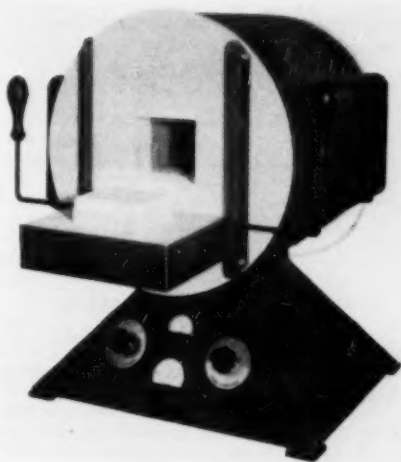
The ball turning rest can also be used in boring a socket. The maximum size

which can be handled is 4 inches on the 14 and 16-inch machines and 6 inches on the 20-inch unit. On some classes of work, concave spherical surfaces with larger radii (up to as much as 11 or 12 inches) can be machined.

### Electric Muffle Furnace

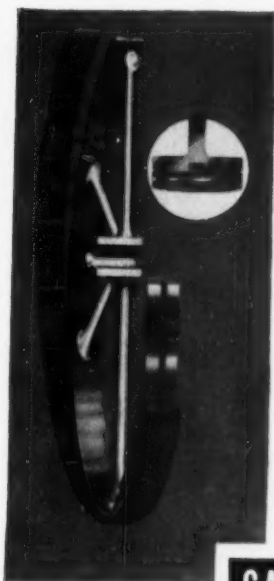
Primarily intended for high temperature research work in the laboratory, the electric muffle furnace illustrated herewith has been placed on the market by the Hevi Duty Electric Co., Laboratory Furnace Division, Milwaukee 1, Wis. The furnace is designed for an operating range of from 1,700 to 2,600 deg. F., using "Globar" heating elements, and is equipped with a ceramic muffle. Manual control is provided by a tap-changing transformer mounted in the furnace base.

Standard equipment includes an ammeter, as well as an indicating pyrometer with noble metal thermocouple. The furnace has inside dimensions of 4 1/4 inches wide x 3 inches high x 7 inches long and an electrical rating of 3,500 watts. Available for operation on either 115 or 230 volts, 60-cycle a.c., the furnace is said to feature rapid heating from room tem-



Hevi Duty Electric Muffle Furnace

perature and low heat loss. Externally prepared atmospheres may be used with the furnace without affecting element life, it is claimed.



*New, Revolutionary...*

## JIFFY-TIRES

ANSWER ALL YOUR BANDSAW TIRE PROBLEMS

That's right! Jiffy Tires are made in sizes to fit any bandsaw wheel. Put on in less than five minutes. No cement, glue, rims, bolts or special tools. Already accepted by foremost bandsaw manufacturers as standard equipment. Jiffy Tires are molded from tread-rubber with a steel backbone.



Rub soap suds around inside of tire. Just tap wheel into the tire with soft mallet.

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for your free illustrated folders on Carter's outstanding Jiffy Tires, Micro-Precision Guides, Rigid Wheels & Tires and Guide Line Lights.



## CARTER PRODUCTS COMPANY

959 MICHIGAN TRUST BLDG. • GRAND RAPIDS, MICH.

## Air Turbine Grinder

Designated as the D1-G, an air turbine grinder with automatic governor has been introduced by the Onsrud Machine



Onsrud D1-G Air Turbine Grinder

Works, 3924 Palmer St., Chicago 47, Ill. The grinder is rated as a  $\frac{1}{2}$  h.p., 50,000 r.p.m. unit.

In operation, as the grinder is held against the work and a resistance is built up that begins to reduce the r.p.m., the automatic governor cuts in a greater air volume to maintain rotational speed. When the work load is removed, the effect of greater air supply under governor control will be to speed up rotation beyond 50,000 r.p.m. When this happens, the governor is again actuated so as to cause the air supply to be reduced to normal.

## STOP DUST

### DUSTKOPS

UNIT TYPE  
LOW COST

### 20 Models

300 to 3600 cfm  
 $\frac{1}{4}$  hp to 5 hp

AVAILABLE FROM STOCK

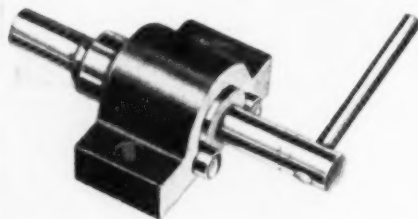
For: Grinders, buffers, polishers,  
woodworking, lint... All Dusts.

Send for Cat. 605a; describe problem.  
AGET-DETROIT CO. • ANN ARBOR, MICH.

## Jig Locking Device

Known as the "Sped-Lok," a unique locking device for jigs has been placed on the market by the Charles Green Co., 1324 W. Roscoe St., Chicago 13, Ill. Said to save production time by minimizing loading and unloading time losses, the jig is claimed to operate with instantaneous, effortless locking and to automatically compensate for variations in diameter of the work being held.

Constructed of high-carbon steel, the unit utilizes hardened, ground cam sleeves and locking pins. Cam sleeve adjustment screws permit accurate settings to be made after the device is mounted.



"Sped-Lok" Jig Locking Device

The Sped-Lok is available in three models, designated as the Nos. A-210, A-211, and A-212. The models vary principally in the cam sleeve lengths.

## Fluorescent Magnifier

Industrial Products Co., 2735 N. 4th St., Philadelphia 33, Pa., has announced an industrial magnifier equipped with fluorescent lighting and designed for assembly workers, inspectors, toolmakers, machinists, and others engaged in close work. The unit floodlights the work area

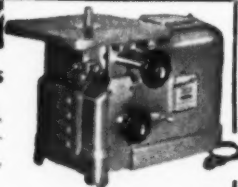
## MILWAUKEE

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... features that result in higher efficiency, improved operating convenience and, most important, lower costs in your filing, sawing, lapping and grinding operations.

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## RICE PUMP & MACHINE COMPANY

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MILWAUKEE 15, WIS.

with scientifically focused, shadow-free fluorescent light, magnifying the work through a high quality 5-inch diameter lens.

The magnifier is available in a bench



Ipco Fluorescent Magnifier

type and portable type. The bench type includes a steel base, two adjustable friction arms, and two swivels (one at

the base and one at the top of the lens frame), thus permitting adjustment to any desired position. The portable type is similar to the bench model except that it is fitted with a comfortable hardwood handle in place of the arms and base. This style is practical for use inside of machines and in other out-of-the-way places. Each type is furnished complete with six feet of rubber cord and ballast plug, ready for use on any 110-220 volt, 60-cycle circuit.

### Marking Machine

Designated as the Model No. 53, a semi-automatic marking machine now being manufactured by The Acromark Co., 9 Morrell St., Elizabeth, N. J., is designed primarily for marking small fuses but is said to be adaptable for the marking of a wide variety of other parts by a change of the ring feed. The machine utilizes a combination dial feed (ring dial) and rotary marking operation.

In operation, a lever at the left of the machine provides for control of the speed through a speed variation unit, and the parts are placed on the ring dial between freely rotating cradle rolls which are



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# BOX THAT LASTS!

**Sterling** Stacking Boxes are designed and constructed to solve your handling problems . . . and save you money. "Top Rim" construction provides stronger support all around the box . . . assures positive stacking. Due to Sterling's method of manufacturing, any size stacking box can be made at standard costs. Other types of shop boxes also available.

*Write for literature and prices.*

**Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.**



Sterling "Top Rim" Steel Stacking Box with drop handles—extra support around the box.



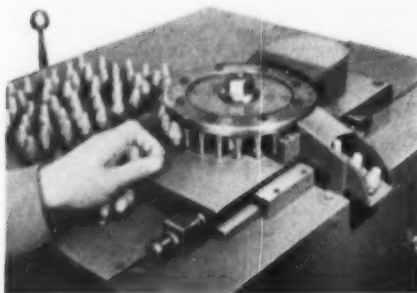
Sterling Bin Front "Top Rim" Steel Stacking Box



# Sterling

Quality Handling & Storage Equipment





Close-up view of Acromark Model No. 53 Marking Machine in use

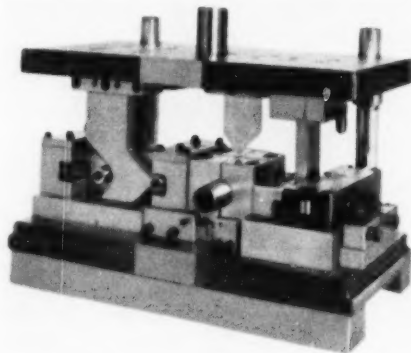
bushing mounted. A positive dwell is provided for each marking, with loading accomplished during this dwell. When the part to be marked reaches the constantly rotating marking roll, it is rotated and marked by the marking roll, after which a guide carries it out on a chute. The ring dial is mounted upon a slide plate with lock screw adjustment for marking depth.

An a.c.,  $\frac{1}{2}$  h.p., 60-cycle, single-phase motor is mounted inside the machine with the variable speed unit, and a push-but-

ton switch is mounted near the variable speed lever. A removable side plate affords complete access to all moving parts.

### Tube Cutoff Machine

A tube cutoff machine for cutting various shapes of tubing to any length to a tolerance of 0.004 inch has been announced by the Vogel Tool & Die Corp., 2529 W. Moffat St., Chicago 47, Ill. Constructed to operate in a power press, the machine is said to cut tubing in  $\frac{1}{2}$  second per cut with minimum burr or distortion. The machine can be operated either manually or with an automatic stop, and utilizes interchangeable dies which are said to allow change-over from one diameter



Vogel Tube Cutoff Machine

size die to another within the range of the unit. Lubrication is provided to all moving parts.

### Cutter and Tool Grinder

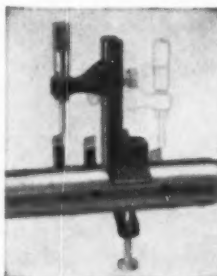
The Brown & Sharpe No. 10N Cutter and Tool Grinding Machine now being manufactured by Brown & Sharpe Mfg. Co., Providence 1, R. I., is available with plain equipment for cutter and tool sharpening only or with universal equipment for the rapid and accurate sharpening of plain milling cutters (straight and helical), formed cutters, straddle and face mills, angular cutters of any angle, side milling cutters, end mills, straight or tapered reamers, and so on. The fixed height of the machine affords easy visibility of wheel and work from the operating positions. All controls are sensitive and can

## SAVE TIME

With

Bartelt

Gages



• Use a Bartelt Pedestal Micrometer for setting boring tools and for many other shop operations requiring accurate positioning relative to a fixed base. Make settings in one step—eliminate cut-and-try methods. Model B, with reversible slide, shown. Write for literature describing all models.

**BARTELT ENGINEERING CO.**

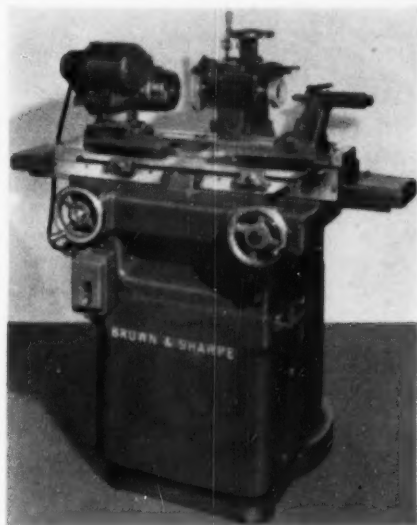
1216 PARTRIDGE AVE.

BELOIT

WISCONSIN

be easily operated from the front, right-rear, or left-rear of the table.

The table is mounted on precision-ground steel rollers which provide for unusually easy table movement. To eliminate any tendency of the carriage to twist on its ways, the transverse movement screw is mounted directly above the V-way and precision ground steel rollers are provided on the flat way. The wheel spindle motor and driving mechanism are enclosed in the base of the machine



Brown & Sharpe No. 10N Cutter and Tool Grinding Machine with universal equipment

where they are completely protected yet easily accessible.

The machine is designed to accommodate work up to 10 inches in diameter between centers and up to 16½ inches in length between the revolving spindle headstock and footstock centers and 20 inches between the center head and footstock centers.

### Drill Chip Breaker

Designed to increase drilling machine output by providing for the production of short chips that assure a free cutting action, the Commander Drill Chip Breaker shown herewith has been introduced by the Commander Mfg. Co., 4224 W. Kinzie St., Chicago 24, Ill. The manufacturer

**IDEAL Electric ETCHERS**

*Easy as Using a Pencil...*

"Universal Model"

### Mark Iron, Steel or their Alloys

Burns a permanent mark right into the metal. Easiest, fastest way to mark part numbers and sizes—material description—owner's name on tools—identification of warehouse items—serial numbers, etc. Easily portable, nothing to get lost. Safe. "Universal" Model—four etching heats; 120, 240, 420 and 700 watts.

### LIVE CENTERS

The point turns with the work, permitting "hogging cuts" to be made at high speed... point will not burn off and cause tool to gouge work. Permanently accurate due to short overhang and unique bearing arrangement. Has special bearing seal. Sizes 1 to 5 morse taper. "Heavy Duty" model also available.



- Increase Lathe Output
- Eliminate Burning of work or center

### OTHER IDEAL PRODUCTION SHORTCUTS

Available from your Ideal Distributor:

- "Hand-Type" Tachometers  
Demagnetizers • Dust Collector

**Sold Through Leading Distributors**

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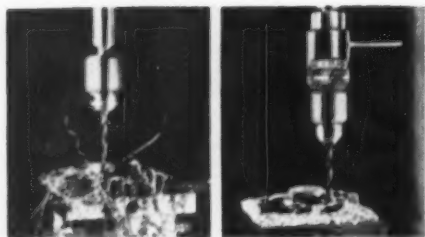


IDEAL INDUSTRIES, Inc.  
1031 Park Avenue, Sycamore, Illinois

Please forward catalog information on Etchers, Live Centers, etc.

Name \_\_\_\_\_  
Company \_\_\_\_\_  
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City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_





(Left) Workpiece being drilled without use of drill chip breaker. (Right) Same workpiece being drilled using Commander Drill Chip Breaker.

claims that the free cutting action afforded through the use of the chip breaker allows coolant to flow down the flutes to reach the point of the drill and thus increase drill life, as well as the number of holes which can be drilled between sharpenings.

With the chip breaker, deep-hole drilling operations are said to be performed quickly and easily since there is no necessity to withdraw the drill in order to clear long chips that might clog the hole, break the drill, and shut off the flow of coolant.

**KENNAMETAL**

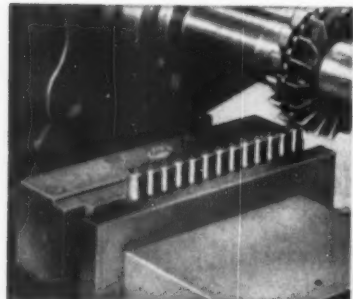
*Cutting Tools*

for Increased Productivity

**KENNAMETAL Inc**  
LATROBE, PA.

**CEMENTED CARBIDE TOOLS,  
BLANKS, MILLING CUTTERS**





## GANG VISE JAWS

**New • Equalizing • Holds All Lengths, Shapes and Sizes**

For faster milling and grinding—the solid Jaw, locked to body, holds a series of equalizing pads with "V" grooves forming a three point holding chuck for each piece of work. Pads and grooves are same width as work diameter.

Send for Illustrated Folder.



**TOOL & DIE CO., PINE MEADOW • CONN.**

## Band Saw Dispenser Reel

Safe handling and storage of band saw stock, easy selection of any desired length of stock, immediate identification of contents and amount on hand, and complete protection of saw stock from rust, dirt and damage are advantages which are claimed to be provided by a band saw dispenser reel announced by The L. S. Starrett Co., Athol, Mass. The easy-to-use reel is designed to hold a 100-foot coil which is secured by a revolving arm that is said to keep the coiled stock safely in place at all times and, when rotated, releases any desired length. A cutout on the side of the reel shows instantly the approximate amount of stock remaining. The reel is clearly



Illustration showing new method of packaging Starrett Band Saw Stock using safety dispenser reel

labeled to show width, type, gauge, and teeth per inch of contents.

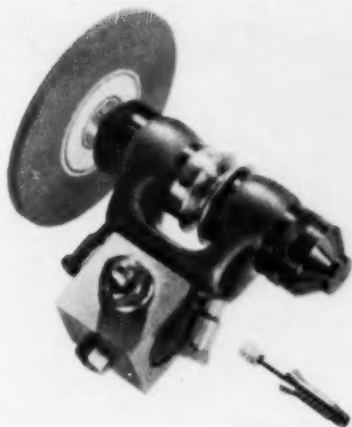
The band saw stock is further protected in shipment or storage by an outer carton-type container which holds one

reel of coiled stock. Information as to type, size, and so on, of contents is printed on an end label. The box is attractively printed in red and yellow and includes on the back recommendations for selecting the proper type and size of band and cutting speed for most metals and other materials.

### Precision Grinding Unit

Available in two types designated as the DHV and DH, a precision grinding unit for internal and external grinding operations is now being marketed under the trade name of "Dero" by the Cosa Corp., 405 Lexington Ave., Chrysler Bldg., New York 17, N. Y. The unit includes a precision double-cone bronze bearing with a pulley arranged in the middle of the grinding spindle to ensure a uniform load on the bearing. Bearing play and temperature expansion are automatically compensated for by a spring washer.

The Type DHV unit has a vertical adjustment of up to 40 mm. and is applicable to a lathe having a center height from the support within the adjustment range. The Type DH can be used on a lathe with a center height from the support of from



"Dero" Precision Grinding Unit

18 to 22 mm. Both types have a speed range of from 2,000 to 10,000 r.p.m. and will readily accommodate grinding wheels up to 4 inches in diameter x  $\frac{3}{8}$  inch in width.

## You are missing a bet! Use U. S. DRILL HEADS with Turret Lathes . . .



**M**ultiple Spindle Drill Heads have many uses, yet oftentimes they are not considered as being applicable to automatic turret lathes.

If you want to reduce labor costs and the number of operations required to complete a particular part, why not see how U. S. Drill Head engineers can help you.

Write or wire us today. There's no obligation, of course, and the chances are that we can save you time and money.

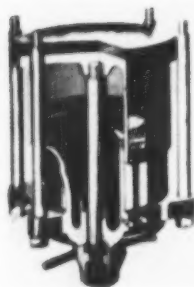
**Manufacturers of all types of fixed center and individual lead screw tapping heads.**



Write Today for FREE 1950 Catalog

**UNITED STATES DRILL HEAD CO.**  
Dept. C, 616-618 Burns Street, Cincinnati 4, Ohio

SINCE 1915



Dayton Rogers Improved Model DA Pneumatic Die Cushion

## Improved Pneumatic Die Cushion

The Dayton Rogers Mfg. Corp., 2824 13th Ave., S., Minneapolis 7, Minn., is now offering an improved Model DA pneumatic die cushion in seven sizes from 5 to 16 inches. The unit has a hardened and ground pin pressure pad that is provided with an oversize center guide rod which is hardened and ground and chrome plated. According to the manufacturer, the oversize guide rod allows for off-center loading of the pin pressure pad without affecting alignment during the work cycle.

The improved Model DA cushion can be mounted directly to the press bolster plate or can be provided with a mounting plate for press bed installation. The unit is furnished complete with a com-

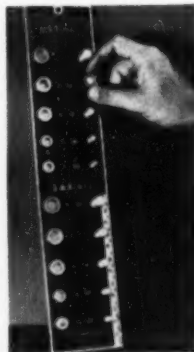
bination reducing-regulating valve and pressure gage which permits the die cushion to be operated off the average shop air line.

## Screw and Nut Locator

A handy screw and nut locator which is designed to quickly indicate the exact size, thread, and type of a particular screw or nut is now being manufactured by the Stewart Mfg. Co., Washington 9, D. C. Made of heavy gauge aluminum with black background having a clear, easy-to-read data etched on the face, the locator can be mounted on a counter or wall, hung on a chain, or carried in a toolbox.

The Stewart Screw and Nut Locator is available in two models which can be used singly or in sets. The Model A is designed for U. S. S. (N. C.) and S.A.E. (N.F.) nuts and cap screws from  $\frac{1}{4}$  to  $\frac{1}{2}$  inch inclusive, and is arranged to indicate the diameter, threads per inch, and wrench opening size for each. A 6-inch rule is provided along the side of the locator for measuring lengths. The Model A is  $3\frac{1}{2}$  inches wide x  $14\frac{1}{2}$  inches high and has a net weight of 10 ounces.

The Model B is intended for machine screws and nuts from No. 0 to No. 12 (N.F. and N.C.) and is designed to indicate type (flat, round, oval, or fillister)



Stewart Model A Screw and Nut Locator

Be Specific

Specify

**ACE**



**DRILL JIG BUSHINGS**

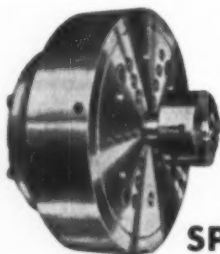
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Over One-Half Million in Stock

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**ACE DRILL BUSHING CO.**

5403 Fountain Ave., Los Angeles 27, Calif.



## ONCE A SKEPTIC

who manufactures millions of automotive transmissions, questioned the ability of Speedgrip Chucks to reduce production costs and improve the quality of second operation work. This manufacturer had an open mind—he tried out a SPEEDGRIP CHUCK—and today twenty-three SPEEDGRIP CHUCKS are working twenty-four hours a day in his plant. Let our engineers help solve your problems too. Send for your copy of the new Speedgrip Manual today.

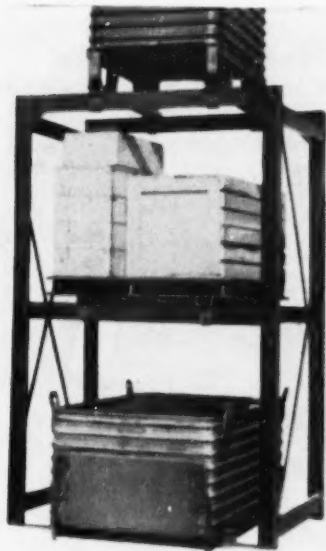
**SPEEDGRIP CHUCK, INC.**

1102 W. Beardsley Ave.  
Elkhart, Indiana

and tap drill size. A 6-inch rule is provided along the right-hand edge of the unit for measuring the length of bolts. The Model B is  $3\frac{1}{2}$  inches wide x  $14\frac{1}{2}$  inches high and has a net weight of 12 ounces.

### Adjustable Storage Rack

An all-steel adjustable storage rack for platform boxes and pallets has been developed by the Palmer-Shile Co., 16022



Palmer-Shile Adjustable Storage Rack

Fullerton Ave., Detroit 27, Mich. The storage of several boxes or pallets of various sizes is made possible by adjustable tracks which may be moved up or down as required. This arrangement is said to be particularly advantageous in the storage of uneven loads. Track channel runners are adjustable to any width.

The storage rack is manufactured to the particular dimensions required by the user. The paint and number of tracks and runners may be specified.

### Stroke Printing Counter

As an addition to its Productimeter line of counting and measuring machines, the Durant Mfg. Co., 1932 N.

## GAMMONS TAPER REAMERS for all types of die work



- Specially treated for modern die steels.
- Rapid cutting capacity.
- Large range of standard sizes.
- Tapers per inch: .005, .008, .013.

Write for  
data sheets.

**GAMMONS • HOAGLUND CO.**

MANCHESTER 2,

CONN.

Manufacturers of helical taper pin, chucking die makers and special reamers.

Buffum St., Milwaukee 1, Wis., has announced the Model "PVR", a "printing counter" of the stroke type which is de-



Productmeter Model "PVR" Stroke Printing Counter

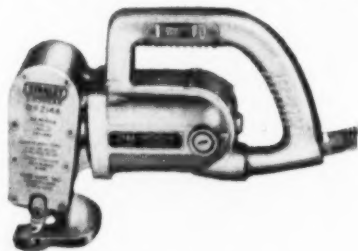
signed to provide both visual and printed records of machine production. The reading line shows the quantity registered in the counter, and an upward stroke of the printing lever prints the figures on a sheet or record form.

According to the manufacturer, the

Model PVR Stroke Printing Counter is designed to stand up under long, hard industrial usage. Construction details include an aluminum housing; accurately machined steel parts; die-cast number wheels assembled with steel drive and reset parts; oilless automotive bearings; steel forged operating lever, and clear-cut reading and printing figures. Rated for speeds up to 500 counts per minute, the counter has wide application on production machinery such as punch and drill presses, lathes, hand screw machines, hydraulic presses, and so on.

### Portable Electric Shear

Stanley Electric Tools, 520 Myrtle St., New Britain, Conn., has announced the Unishear No. 214A, a lightweight, streamline portable electric shear that is designed to cut up to 14 gauge hot rolled steel (other materials in proportion) at a speed of 15 to 20 feet per minute. A simple



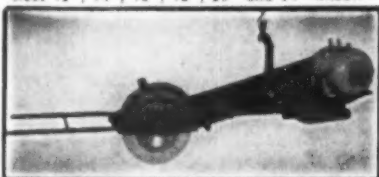
Stanley Unishear No. 214A

blade motion "feeds in" the work so that little effort is said to be required by the operator in cutting straight lines, curves, angles and notches with hairline accuracy.

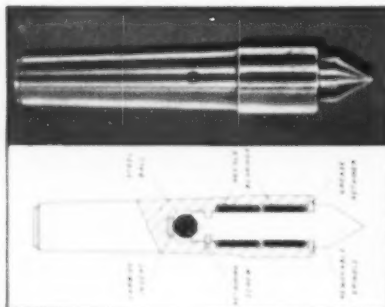
The tool is equipped with a universal

### MUMMERT-DIXON SWING FRAME GRINDERS

Sizes 12", 14", 16", 18", 20" and 24" wheels



Ask for Descriptive Circular  
MUMMERT-DIXON CO.  
120 Philadelphia St. • Hanover, Pa.



### PRICE... is not the only advantage of WEE LIVE CENTERS

1. PRECISION — run-out held to .00015 maximum.
2. SMALL HEAD — permits use on any operation 30 to 40% less overhang.
3. "PENCIL SHARPENED" PRICE — Nos. 1, 2 and 3 — M.T. or straight shank — \$15.00. No. 4 — \$21.00. No. 5 — \$36.00 with male tips. Request folder.

Distributors: Some territory available  
HERBERT CROSS & SON, Bala-Cynwyd, Pa.



1950 Thomas Metalmaster Junior

motor of full ball and roller bearing construction which can be operated on either d.c. or a.c., 60 cycles or less. The net weight of the unit is 9½ pounds.

### Metal Disintegrator

A compactly made, easily handled metal disintegrating unit which may be attached to and operated on any standard drill press is now being produced by the

Clinton Machine Co., Metalmaster Division, Clinton, Mich. Identified as the 1950 Thomas Metalmaster Junior, the unit is said to remove taps, drills, and so on, from holes without distorting the threads and may also be used for cutting shaped holes in dies.

Completely self-contained, the disintegrator, according to the manufacturer, is designed to remove broken taps from 0.080 to 1 inch, as well as other broken tools and parts such as reamers, studs, pins, plug gages, and drills. Shapes of holes which may be cut in carbides or any hardened metals with the unit include rounds, elongateds, open squares, blind squares, hexagonals, and pinion shapes.



"Augur Movement" Transmission in Use

### Power Transmission

Metal Seal & Products, Inc., 21881 St. Clair Ave., Euclid 17, Ohio, has announced the availability of a power transmission, known as the "Augur Movement," for use with standard honing and lapping machines to accelerate

## PRECISION DRILLING

up to 1½"

Speed-Right Model 601

- ★ Fingertip Variable Speed
- ★ Sensitive Precision Spindle
- ★ Quick-set Drill Depth Stop
- ★ Built-in Ball Bearing Motor
- ★ 16" Model 300 to 5,000 RPM

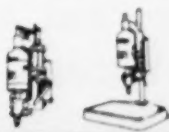
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3" HIGH SPEED  
SMALL HOLE DRILLING  
.004 to .156"

Speed-Right Manual and air feed drilling machines feature controlled uniform spindle speeds 1000-10,000, 2500-15,000 RPM.

Priced from \$124 complete.



THE ELECTRO-MECHANO CO.

265 EAST ERIE STREET  
MILWAUKEE 2, WISCONSIN



production and facilitate superfinishes. In addition, the unit is applicable for use with drill presses, screw machines, and lathes, as well as other standard machine tools. Fixtures are recommended for workpiece holding and subsequent multiple operations. Faces, flats, cones, plugs, and any diameter round hole can be finished in minimum time using the transmission, it is claimed.

The accompanying illustration shows the Augur Movement utilizing a standard drill press as a power source to lap a three-way hydraulic selector valve. In most applications involving honing or lapping, the Augur Movement is utilized as a power transmitting unit between the workpiece holder and the power source. In operation, the unit reduces a constant speed input to produce a unique quick-reversing action that interrupts the rotation of the output shaft every 45 degrees of travel. The interrupting action is a short backup motion and occurs from 8 to 11 times in one complete revolution of the output shaft. The speed reduction is approximately 8 to 1.

### FINE TOLERANCE GEARS INSTRUMENT WORK

Spur, Helical, Worms, Worm Wheel,  
and Straight Bevel Gears.  
We also cut Spiral Bevels.

### DYNAMIC GEAR CO.

50 Elmwood Ave. Brooklyn 30, N. Y.

## Helical Diemakers' Taper Reamer

Made with a taper which is said to provide the correct clearance in piercing dies, the helical diemakers' taper reamer now being marketed by The Gammons-Hoaglund Co., Manchester, Conn., is made of high speed steel and is available



Gammons Helical Diemakers' Taper Reamer

in a wide range of standard sizes, including sizes having tapers of 0.013 inch per inch, 0.005 inch per inch, and  $\frac{1}{4}$  degree per inch. Diameters at the small end range from 0.045 to 0.690 inch and diameters at the large end from 0.051 to 0.806 inch. The reamer is offered in overall lengths from  $2\frac{1}{8}$  to  $10\frac{1}{2}$  inches.

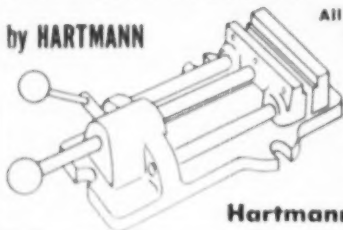
## Storage Equipment

Lyon Metal Products, Inc., 238 Monroe Ave., Aurora, Ill., is now marketing redesigned storage equipment for toolrooms and stockrooms. A correct type of storage accessory is available for every item.

The tool rack shown herewith contains a (1) sloping front unit which provides 88 openings in eight depths with shelf dividers adjustable every inch for the storage of small tools and supplies; (2) drawer case unit, each drawer having five dividers for the storage of small tools and cutter supplies; (3) sloping shelf unit having 108 compartments on eight shelves for storing drills, reamers, and taps; and (4) swinging panel unit which provides almost 27 square feet of storage area (holes punched every inch) for milling cutters, gages, and templates. Other

## INSTANT ACTION

by HARTMANN

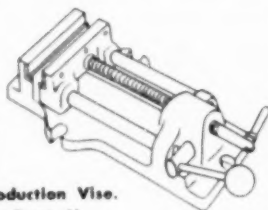


## RAPIDSET

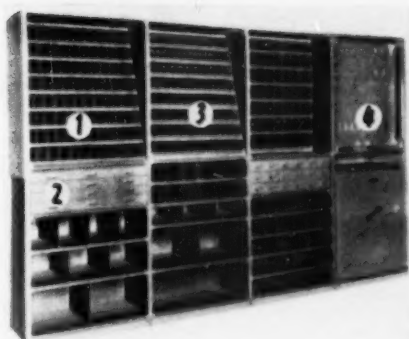
All Purpose Tool Room And  
Machine Shop Vises.

## The JAWSET

Adjustable Pressure Production Vise.  
For Information Write Dept. M



Hartmann Mfg. Co., 1637 Gould St., Racine, Wis.



Lyon Tool Storage Rack

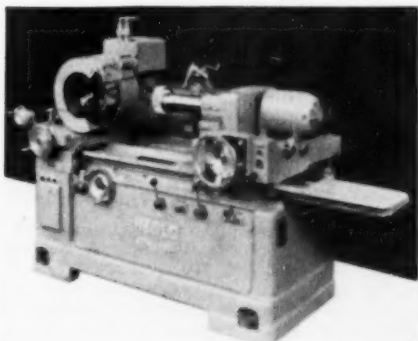
storage units available include drill rod units, pigeon hole units, and waste bins for rags and waste.

### Internal Grinding Machine

Designated as the Model 274, a universal internal grinding machine which is designed to handle a wide variety of tool-room work and is also adaptable for longer production operations is now being manufactured by The Heald Machine Co., Worcester 6, Mass. The workhead on the machine may be swiveled up to 90 degrees to provide a wide angular capacity, and is hydraulically driven, thus permitting an infinite variety of speeds within a range of from 40 to 350 r.p.m. to be obtained.

The Heald Model 274 Universal Internal

Heald Model 274 Universal Internal Grinding Machine

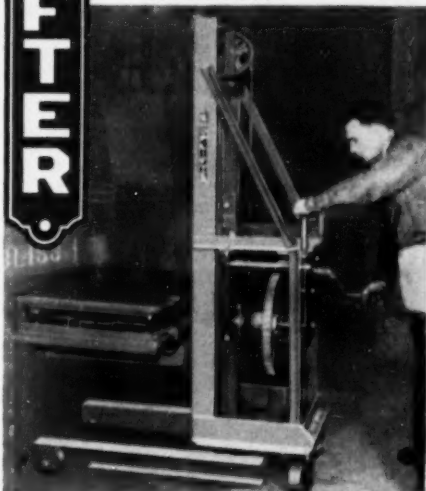


June, 1950

## SHOPLIFTER



... let an Economy SHOP-LIFTER do the heavy work around here.



Every shop needs a SHOPLIFTER. Saves men, saves materials. Besides handling heavy dies, the SHOPLIFTER can stack drums and boxes, unload street trucks, pick up skids and be used as an adjustable height table.

All steel, arc welded frame. Easily operated hoist unit with automatic brake, safely holds load at any height.

#### 500 pound capacity

Type D, hand operated.....\$152.40  
Type DE, electric 1/3 HP unit.....\$309.00

#### 1000 pound capacity

Type DX, hand operated.....\$294.00

#### 2000 pound capacity

Type DX, hand operated.....\$354.00

Floor lock to hold machine steady;

\$9.60 extra for 500 pound sizes;

\$14.40 extra for type DX models.

Prices net F.O.B. Chicago

**ECONOMY ENGINEERING COMPANY**

4507 W. LAKE STREET • CHICAGO 24, ILL.

Grinding Machine can be used to grind straight or taper holes, straight or taper outside diameters, and flat or convex surfaces.

### Solid Carbide Blade Milling Cutter

The Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich., has developed a solid carbide insert blade cutter head for cast



Super Solid Carbide Blade Milling Cutter

iron which features a locking arrangement that permits a maximum number of blades to be incorporated in a given size of cutter. A locking wedge placed below each blade is actuated by a set screw which moves the wedge in for locking and out for blade removal.

This design is said to result in long blade life since the blades can be used down to approximately  $\frac{1}{2}$ -inch length. A further advantage of the design is that it permits the blades to be

moved forward in the direction of the greatest wear.

The solid carbide blade milling cutter is available in sizes ranging from 6 inches in diameter with 12 teeth to 14 inches in diameter with 28 teeth.

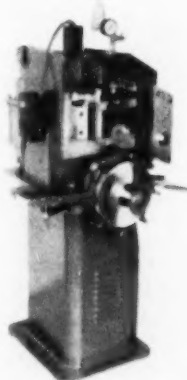
### Marking Machine

Designated as the Noblewest Model No. 302, a marking machine developed by The Noble & Westbrook Mfg. Co., 25 Westbrook St., East Hartford 8, Conn., is designed for the heavy duty marking of round metal parts such as studs, rods, bushings, and so on, and is constructed with a horizontally positioned main spindle on which a vertical carrier dial is placed. The motor-driven spindle is mounted in anti-friction bearings and continuously rotates the work carrier and back-up pressure dials.

In actual operation, the rotating carrier dial picks up the individual workpiece from a gravity feed, carrying them along to the marking station where they are marked and then automatically unloaded. The machine is equipped with a floating die holder mounted on a rigid shaft off center at the right of the machine.

The holder operates against a mill type air cylinder which acts as a cushion to compensate for the variations in diameter from one part to another. The air pressure controls the depth of marking and is said to provide a uniform inscription for the full length of the mark regardless of minor surface irregularities.

The machine is furnished complete with motor, electrical controls, air cylinder, and pneumatic controls.



Noblewest Model No. 302 Marking Machine

Yes, but when are stainless steel prices coming down so that we can lower our costs and still show a profit?

Right now. We can cut your costs up to 30%. How? WRITE TODAY!

Submit specifications on sheet strip, rod, wire and tubing. Large stocks in principal cities.

**DEPENDABLE**

Sales



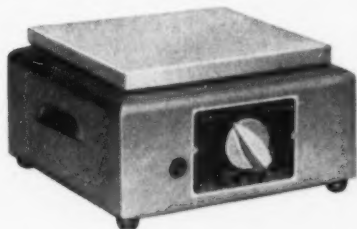
CORPORATION

315 Gold St. Brooklyn 1 N Y

### Electric Hot Plate

An electric hot plate announced by the Thermo Electric Mfg. Co., 488 W. Locust St., Dubuque, Iowa, features an extremely sensitive thermostat which provides completely variable control from 100 to 700 deg. F. Temperature variation is said

to be held within 5 degrees at 100 deg. F. and within 2 degrees from 200 deg. F. to maximum. The control dial is numbered to indicate approximate tempera-



"Temco" Electric Hot Plate

ture settings, and a neon indicating light glows while the plate is heating.

Designed to heat quickly and evenly, the 6 x 6-inch cast aluminum surface plate of the unit is well insulated on the bottom and side and is mounted within a metal body with only four small points of contact to minimize heat conduction to the body. Heating elements are made from nickel-chromium alloy, and thermo-

stat contacts are high grade silver and of large diameter for cool operation.

The "Temco" Electric Hot Plate weighs 4½ lb. and is said to be capable of supporting many times its own weight. Dovetail sockets are provided to facilitate apparatus setups.

### Keyway Broaches

The Kase Machine Co., 18432 Buffalo Ave., Cleveland 19, Ohio, has announced the expansion of its standard line of "Glenny" broaches to include sizes from ⅜ to 2 inches in increments of ⅛ inch. A 2½-inch broach is available also as part of the standard line. Each of the new sizes features a patented tooth design which provides a large chip chamber. End nuts facilitate rapid and infinitely variable adjustment for depth of cut by moving the cutting blade back and forth in a taper-milled slot. Hand tightening of the end nuts locks the cutting blade firmly and positively in position.

Glenny broaches are particularly recommended for use in job applications where a wider variety of keyways are to be cut. Bushing type adapters are available for use with all of the new size

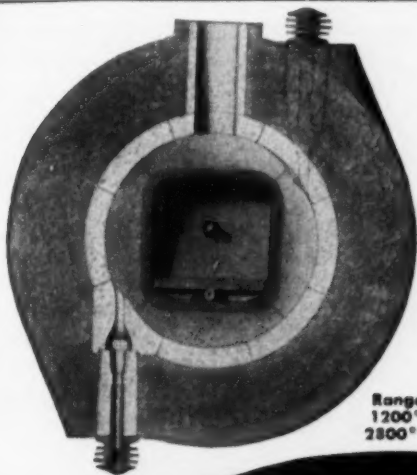
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Inside Story!**

### On the DELAWARE Controlled Atmosphere FURNACE

The complete story of the tangential firing principle and other distinctive features of the DELAWARE Controlled Atmosphere FURNACE is told in Informative Bulletin F-1.

*Learn the facts of  
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1200°  
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**DELAWARE  
TOOL STEEL CORP.**  
Wilmington, Del.

## ARTUS PLASTIC SHIM



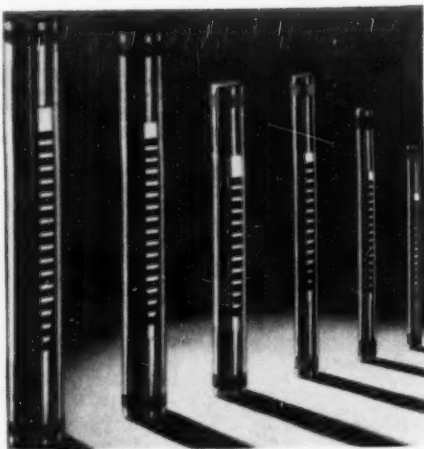
AND  
**FEELER  
GAUGE  
STOCK**

The **COLOR**  
tells the  
**THICKNESS**

Each thickness a distinctive, easy to identify color. Impervious to oil. Long lasting. 5"x20" sheets. Special sizes to order. Handy assortment, shim stock, 12 colors—12 thicknesses (.001-.030). Bound together. \$4.25.

Order today. Immediate delivery.

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434 Broadway, Dept. M, New York 13, N. Y.



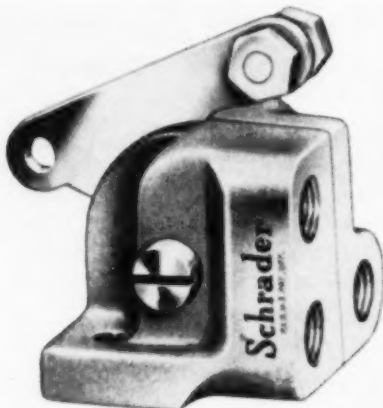
Glenny Broaches

broaches to permit keyway cutting in bores larger than standard broach diameters.

## Sliding Seal Control Valve

A. Schrader's Son, Dept. MS-2, 475 Vanderbilt Ave., Brooklyn 17, N. Y., has announced a sliding seal control valve designed to operate small-bore single-acting cylinders such as air clamps. The valve body houses a precision-lapped stainless

Schrader Sliding Seal Control Valve  
with mechanical lever



**Co Clark**  
**ADJUSTABLE  
TOOL  
HOLDER**

Vise-grip jaw runs full length of cutter channel, firmly and safely holds tool bits of all shapes, sizes and materials

### Specifications

Model	Size	Tool Capacity
60	0	1/8 to 5/16
61	1	3/16 to 3/8
62	2	1/4 to 1/2
64	4	5/16 to 5/8

With 15° or parallel cutter channel,  
left or right hand

**ROBERT H. CLARK COMPANY**  
Beverly Hills, California

Manufacturers of Precision Cutting Tools

steel disc which slides on a bronze ring to provide a positive airtight sealing action. The valve is compact, durable, and has a minimum number of working parts, all of which are easily replaceable. One steel bolt holds the two piece body and internal parts in place.

Available for hand, foot, knee, or mechanical actuation, the valve has  $\frac{1}{8}$ -inch ports which deliver a full line flow, thus making the valve especially adaptable not only for small bore cylinders but also for cylinders up to  $3\frac{1}{2}$ -inch bore in short strokes. Actual dimensions of the valve body are  $1\frac{1}{8}$  x  $1\frac{1}{4}$  inches.

### Strippable Coatings

Fidelity Chemical Products Corp., 470 Frelinghuysen Ave., Newark 5, N. J., has announced a strippable coating, designated as the SP-14, for enameled, lacquered and plastic surfaces, and Dip-Pak No. 532, a hot melt coating for metal parts, such as tools, gears, and machined components. Both products are designed to provide temporary protection during processing, storage and shipping.

Fidelity SP-14 is a light, cream-colored liquid with good stability and, due to a neutral pH, will not affect color or any type of finish to which it is applied, the manufacturer states. When dry, the film is said to be non-inflammable, elastic, tough, abrasive resistant, and firmly adherent to the surface to which it

is applied. The film, however, can be removed by a steady pull when desired.

Dip-Pak No. 532 is supplied in briquette form and, when melted and applied to a metal object, is said to provide a pale, transparent, tough, abrasive-resistant, moisture-resistant and rust-resistant coating. The coating can be removed by slitting down the middle and peeling. The material, it is claimed, can be used over and over again by simply remelting. It is also said to be essentially non-inflammable during application and corrosion resistant under climatic and weathering conditions.

## REDUCED MACHINING COSTS RESULT FROM WISE SELECTION OF CUTTING FLUIDS

### STUART'S WISE ECONOMY PLAN

provides the method

Not just another spot check "oil survey," the Stuart plan is a scientific appraisal of a plant's over-all needs

coupled with practical suggestions and followed through with a continuing technical service.

Ask to have a Stuart Representative explain the WISE ECONOMY PLAN to you.



**D.A. Stuart Oil co.**  
EST. 1845 LIMITED

2741-47 S. Troy St., Chicago 23, Ill.



### Size-Marked Hex Key

The Parker-Kalon Corp., 200 Varick St., New York 14, N. Y., has announced that its engineered hex key is now avail-



P-K Size-Marked Hex Key

able size-marked for easy identification. Clearly stamped on the side of the handle is the key size and the corresponding socket set and cap screw sizes it will fit.

Scientifically engineered to provide the proper leverage, according to size, the hex key is made of a special analysis alloy steel which is heat treated to assure maximum resistance to torque stresses and freedom from brittleness. The ends are chamfered for easy insertion; close tolerances are said to assure proper fit in sockets.

The size-marked hex key can be furnished in 16 sizes with hex diameters from 0.050 to 1 inch. Convenient sets of

the 11 most commonly used keys are also available, one in a compact and durable plastic case and another in an attractive steel case with a unique easy-to-use key island. Both sets include a simple interchangeability table which further facilitates quick and accurate key selection.

### Flexible Shafting Torque Calculator

An "on the job" slide rule for calculating torque loads on flexible shaft equipment has been developed by the Stow Mfg. Co., 1 Shear St., Binghamton, N. Y. This pocket-size calculator is said to be



Stow Flexible Shafting Torque Calculator

especially valuable in that it solves torque problems and indicates size of shaft which performs most efficiently at a given r.p.m.—within a given radius.

The calculator is available to design engineers and business executives confronted with power drive problems who address their requests on company letterheads direct to the company.

### Taper Interchangeable Drive

The Falcon T-I Drive developed by the Falcon Tool Co., 12507 Greiner Ave., Detroit 5, Mich., can be adapted to practically any shank type cutting tool used for drilling, boring, reaming, milling, and so on. The drive includes a sturdy taper (with practically no overhang) which is accurately ground. The cutting portion of the tool is ground true with the taper, with the result that the finished tool is absolutely concentric with the shank. A two-point positive drive is provided so that the cutting load is equally divided when the tool is inserted in the holder, which is accurately ground to receive the cutting portion of the tool.

The cutting tool is held in the holder by simply inserting and slightly turning to the right until it snaps in place. To remove the tool, it is merely turned in the opposite direction until it pops out.

## MARVECO Live Centers



- HEAVY DUTY
- LONG LIFE
- HIGH SPEED

MARVECO is the time-tested live center with unlimited capacity—50 pounds to 50 tons guaranteed to outperform and outlast any other live center. You can depend on MARVECO for trouble-free production.

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SEND US YOUR CENTER PROBLEMS

**MARVEL TOOL & MACHINE CO.**

1096 North River Road • St. Clair, Michigan

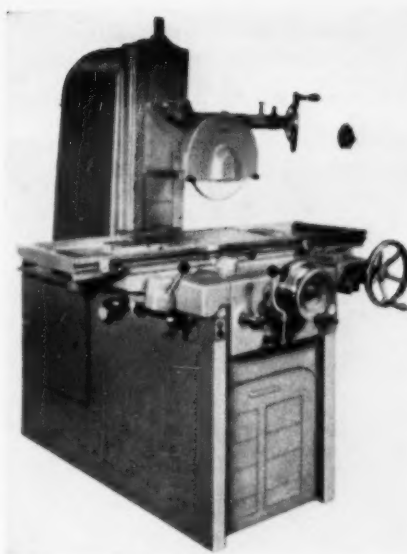
This principle of construction is said to reduce wear and breakage to a minimum since there is claimed to be no chatter or binding of the tool in the holder due to expansion from heating.

The Falcon T-I Drive can be furnished on high speed as well as carbide tools.

### Surface Grinder

Designated as the No. 1218 "Hydrabrasive," a surface grinder featuring hydraulic operation for use wherever precision transverse adjustment is required has been announced by the Abrasive Machine Tool Co., East Providence 14, R. I. The grinder provides for a 12-inch wide cross travel with a moderate table length of 18 inches. Table speeds are said to be almost instantly adjustable from  $\frac{1}{2}$  to 90 f.p.m. with  $\frac{3}{8}$  inch of cross feed movement in 2/10 second.

Power is supplied by a fan-cooled totally-enclosed 3 h.p. spindle motor which drives a 12-inch wheel. A deep, massive base minimizes vibration. The grinder has a slow speed range for crush grinding on the one extreme to fast conventional grinding on the other. The machine can be equipped with special fixtures for high speed production grinding.



Abrasive No. 1218 "Hydrabrasive" Surface Grinder



## For Simplicity In OIL GROOVING!

The FISCHER No. 1 Oil Groover cuts a wide variety of grooves in bearings up to 8" in length and up to 5" inside diameter. A few simple settings permit you to cut continuous, relieved, straight or spiral grooves at any angle from parallel to perpendicular to the work. Grooves may also be cut in shafts, housings, etc.

This machine will slash grooving time and deliver continuous profitable production in your shop. It will pay to find out what it can do on your grooving jobs.

**Write for Catalog.**

## Fischer Machine Co.

316 N. ELEVENTH ST. — PHILADELPHIA 7, PA.

Established 1900

Send parts  
for free  
grooving and  
production  
estimate

## Tire or Band Saw Wheels

As an addition to its line of band saw accessories, the Carter Products Co., 959 Michigan Trust Bldg., Grand Rapids 2,

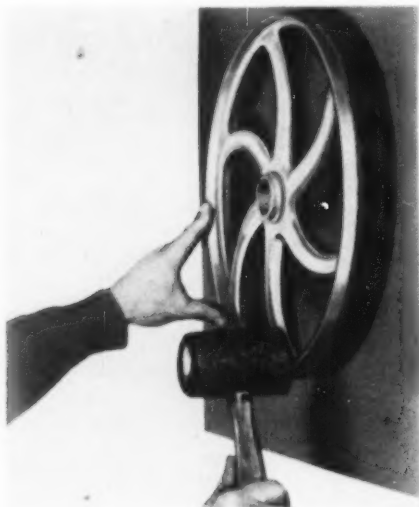


Illustration Showing Manner of Installing "Jiffy-Tire" on Band Saw Wheel

Mich., has announced the "Jiffy-Tire" shown in the accompanying illustration. Available in sizes to fit any band saw wheel, the tire can be quickly and easily affixed to the wheel by simply rubbing soap suds on the inside of the tire and then gently tapping the wheel into the tire with a rawhide mallet. "Grip-tite" cleats on the inside diameter of the tire hold the tire firmly to the wheel, thus assuring complete working safety for operators, it is claimed.

The Jiffy-Tire is made of genuine molded tread-rubber with a steel backbone running through the tire, and is accurately balanced and finished with a crowned face to provide even tension on the band saw blade.

## Welding Gloves

The Air Reduction Sales Co., Division of Air Reduction Co., Inc., 60 E. 42nd St., New York 17, N. Y., has announced the addition of three new styles of welding gloves, labeled "A," "B," and "C," to its welding supply line. The "A" glove is made of soft, rugged carpincho leather with a wool-lined back for maximum heat resistance. A one-piece leather back, which includes fingers and gauntlet, is designed to eliminate exposed seams and to increase the life of the glove, the manufacturer states. Stitching is of the inseam type, and extra protection is provided by a 1/4-inch wide leather welt which extends around the thumb seam and across the base of the fingers.

The "B" glove is a gauntlet type and offers the same construction features as the "A" style. The "B" style has palm, thumb, and fingers made of chrome-tanned horsesplit, with No. 1 cowsplit back. The "C" glove has a two-piece lined leather gauntlet and is made similarly to the "B" glove. All three styles of gloves are medium-full in size.

## Planer Time Calculator

A precision planer slide rule which is designed to provide a quick and accurate means for calculating the actual planing time of a planer equipped with a modern variable voltage drive is now being distributed by The G. A. Gray Co., 3611 Woodburn Ave., Cincinnati 7, Ohio. The all-vinylite calculator is furnished con-

## PRECISION VERNIER CALIPER

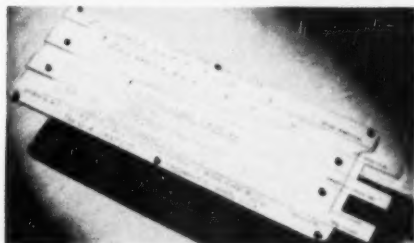
for inside, outside, and depth, with both metric and inch scales. Highly accurate.

A detailed illustration of a precision vernier caliper. The tool is shown in its open position, revealing the main beam with dual scales (metric and inch) and the sliding frame with a vernier scale. The jaws are clearly visible.

METRIC: 1 mm with vernier 1/20 mm. INCH: .025" with vernier .001". Overall length, 8", with capacity of 5 1/4". For the toolmaker, machinist, inspector and mechanic. Made in Germany by top craftsmen, this precision vernier caliper, including wooden case, costs **ONLY \$15.50**

**FRANK MITTERMEIER •** 3577 East Tremont Ave., New York 61, N. Y.

tained in an attractive protective case with instructions for its simple operation. The reverse side of the calculator features



Gray Planer Time Calculator

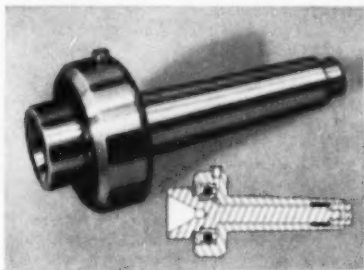
a chart of planing speeds and feeds for high speed steel and carbide tools.

The planer time calculator is available at a price of \$2.00 postpaid.

### Female Live Center

A female live center designed especially for supporting centerless shafts is now being manufactured by the South Bend Lathe Works, 427 E. Madison St., South Bend 22, Ind. As shown in the cross-section drawing, the center is provided with a 60-degree cup that receives the shaft end. The center is available in two sizes, one with No. 3 Morse taper shank and maximum work capacity of 1 inch, and the other with No. 2 Morse taper shank and  $\frac{3}{4}$ -inch work capacity. Both sizes will accommodate work diameters down to  $\frac{1}{8}$  inch.

The revolving center is made from elec-



South Bend Female Live Center

tric furnace steel heat treated to a hardness of 61 to 65 Rockwell C. The center shaft extends through the taper shank

**TRY** a gallon of  
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... at our risk\*

**GET** better, cleaner  
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**SAVE** up to **85%**  
... of weld cleaning costs

Brush or spray Protect-O-Metal No. 2 on weld seam and on adjacent metal ... weld ... then simply wipe off spatter with a dry cloth. Don't waste time, manpower, or profits cleaning up welds with air chisels, wire brushing or sand blasting. Protect-O-Metal No. 2 is the *one* smokeless, odorless, spatter proofing compound. Costs about 1/10¢ per foot of weld, saves up to three times its cost.

### PROTECT-O-METAL No. 2

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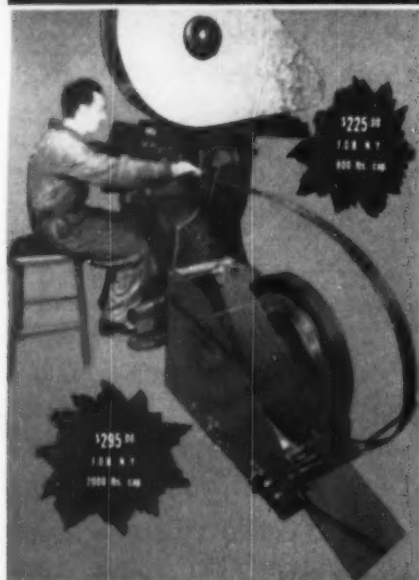
\*O.K. Send me a trial gallon of PROTECT-O-METAL No. 2 and a bill for \$3.15. I understand you will cancel the invoice if I'm not entirely satisfied.

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Dealer inquiries invited.*

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Machine Tools**

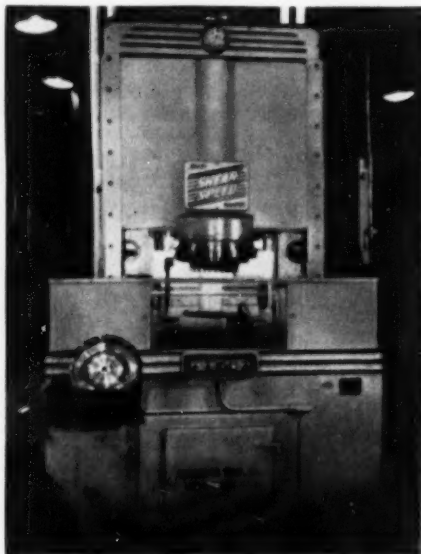
53 PARK PLACE  
NEW YORK 7, N. Y.

315 ASYLUM STREET  
BRIDGEPORT, CONN.

and is rigidly supported at both ends. A specially designed precision ball bearing accommodates both the radial and thrust loads of the work, and a plain pilot bearing is said to eliminate center shaft whip. All parts may be easily replaced in the event of damage.

**Internal Gear Shaper**

The Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., has announced the addition to its "Shear-



**Michigan "Shear-Speed" Gear Shaper Tooled  
for Cutting 48 Internal Involute Teeth in 12-Inch  
Diameter Housing**

Speed" line of a machine for the cutting of internal spur gears, splines, and other miscellaneous forms. Practically any irregular shape can be cut on the machine providing it lends itself to form cutting with radially fed tools. The minimum inside diameter which can be handled is 5.4 inches, and the maximum inside diameter which can be cut is approximately 20 inches.

In operation, the "internal gear" Shear-Speed machine simply reverses the tool-feed action of the machines used for the cutting of external forms. Using two inverted cones, the tools are fed outward before each stroke of the reciprocating work and its holder. They are retracted

slightly before the return stroke to prevent tool drag. The feed is decreased to finish-feed as the proper depth of cut is approached. Two or three strokes at exact depth (without feed) are generally used to "clean up" before the head retracts and the machine stops for reloading.

When necessary, the individual form tools of the machine can be reground by locking together on the magnetic chuck of a surface grinder and merely removing a few thousandths of an inch from the top faces of the tools simultaneously.

### Improved Replaceable Face Hammer

Greene, Tweed & Co., North Wales, Pa., has announced new design features for its "Basa" Replaceable Face Hammer which is constructed for the rapid replacement and interchange of hammer faces available in rawhide, Basa molded composition, plastic, copper and babbit.

New features include a freer play between jaws of the retaining head to insure a positive take-up and firm grip on the faces despite any variations in the circumference of faces; shaping of the handle to fit the hand; lacquering of the



"Basa" Improved Replaceable Face Hammer

handle and enameling of the grip portion to preserve cleanliness and appearance; and rust-inhibiting aluminum coating for metal parts, the coating being baked on to provide a hard wearing surface.

### Shatterproof Hack Saw Blade

Identified as the Victor "Molyflex," a flexible, high speed steel hack saw blade that is said to be shatterproof and unbreakable when used in a frame has been placed on the market by the Victor Saw Works, Inc., Middletown, N. Y. Specially

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HERE are the basic theories and principles of electroplating—the practical methods and processes that are of invaluable use to everyone concerned with electroplating and electrotyping. The most efficient methods of making electrodeposits on more than 40 different metals, alloys, and plastics are summarized completely in this thoroughly revised and enlarged book.



## Principles of ELECTROPLATING & ELECTROFORMING

By William Blum, Chemist, U. S. Bureau of Standards and George H. Hogaboom, Consultant

Revised 3rd Edition  
455 pages, 6 x 9  
24 tables, illus.  
\$6.00

Completely revised to make it a more practical working guide, this book summarizes and digests the best of modern practice in the field. It covers qualitative, quantitative analyses of solutions; pickling, dipping; electroplating; electroforming, electrotyping; producing phonograph record matrices, and manufacturing tubes, etc. Metals are dealt with in the same order as in the periodic system of elements.

(Please send check with order)

**PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio**





Illustration Showing Extreme Flexibility of Victor "Molyflex" Hack Saw Blade

heat treated to provide maximum flexibility together with high cutting qualities, the blade has an overall gold color with specifications clearly printed thereon in green, and is readily available in all popular sizes and pitches for hand sawing operations.

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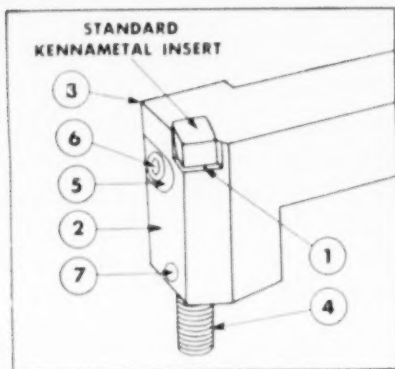
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# SNOW

SNOW MANUFACTURING COMPANY  
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(Chicago suburb)

## Improved Toolholder

An improved Kennamatic Toolholder has been developed by Kennametal Inc., Latrobe, Pa. Features include (1) broached construction which fully encloses the Kennametal insert to provide maximum strength and accuracy; (2) solid backing for insert in the direction of cutting forces; (3) heat-treated alloy steel shank which is said to resist distortion and chip erosion; (4) large hollow back-up screw which permits insert to be pushed out without removing the screw; (5) improved clamping arrangement which supplements cutting forces; (6) front wrenching which is claimed to make the toolholder



Improved Kennamatic Toolholder

ideal for multiple setups since the clamp is always accessible; and (7) friction lock on back-up screw.

## Process for Salvaging Collets and Feed Fingers

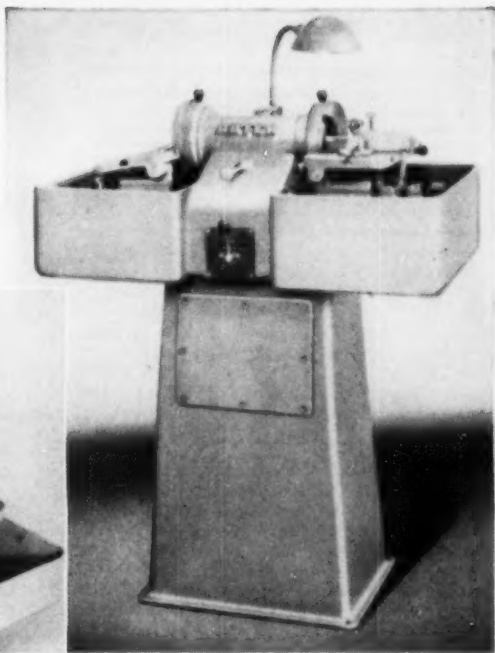
S & E Machine Products, Inc., Bridgeport, Mich., has announced a process for salvaging collets and feed fingers normally worn oversize. The process, which enables worn collets and feed fingers to be reclaimed and restored to their original precision, involves the reworking of the worn parts to allow for the insertion of carbide wear sections which are then ground to new collet dimensions.

The process is said to be especially applicable to collets used in high speed automatic work or similar long run applications where accuracy must be maintained with minimum down time. The reworking process eliminates annealing so that the original hardness and temper of the part are not appreciably changed, it is claimed.

# ARTER

## IMPERIA

### Carbide Tool Grinder



Off-hand grinding of tools is seldom a satisfactory operation. Hands are unsteady, tool shanks can be

ARTER IMPERIA CARBIDE TOOL GRINDER work tables are movable. Tables are held on two pivot-edged side plates by vertical tension springs, forming a flexing mounting. Very light hand pressure moves table and tool forward and back across the face of the diamond wheel. When grinding chip breakers the wheelhead also can be moved up and down, a compression spring giving smooth easy action. This compact double-table machine can be set up for roughing and finishing tools, finishing and polishing, or finishing and grinding chip breakers.

rough or not flat, work tables may not be smooth. The result — poor tool grinding, shorter life between grinds, possible damage to expensive diamond wheels.

**ARTER Grinding Machine Co.**  
WORCESTER, MASS., U. S. A.

## New Shop Literature

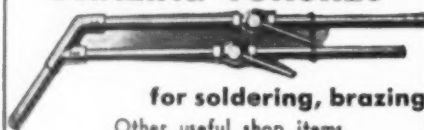
The publications listed in this section may be obtained free upon written request on company letterhead to the manufacturers concerned. Your courtesy in mentioning **MODERN MACHINE SHOP** when requesting copies of these publications will be sincerely appreciated by the manufacturer and the publisher of this magazine.

**"Machine Shop Time Savers"** is the title of an eight-page two-color booklet released by the J&S Tool Co., Inc., 475 Main St., East Orange, N. J. The booklet provides information on the company's line of radii and angle dressers, cutting tools, vise jaws, parallels, and jaw clamps, as well as form grinding service.

**Hack Saw and Band Saw Blades.** The Henry G. Thompson & Son Co., New Haven 5, Conn., has announced the availability of four new product folders covering hack saw and band saw blades. The folders feature factual product presentations, application illustrations, hints on metal cutting, and other information of general interest.

**Vibratory Material Handling Equipment and Power Tools.** A 128-page three-color catalog (No. 501) has been published by the Syntro Co., 300 N. Lexington Ave., Homer City, Pa., which describes and illustrates its complete line of vibratory material handling equipment and power tools. Information and data on vibrators, hopper level switches, vibratory packers, hydraulic jolters, feeders, screens, pickling tables, special controls and control panels, batch weigh plants, selenium rectifiers, joggers, shaft seals, fluid couplings, and various other equipment are included.

## BRAZING TORCHES



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Other useful shop items.

Write for illustrated circular.

**BUFFALO DENTAL MANUFACTURING CO.**  
Buffalo 3, New York

**Taper Pins.** A four-page catalog and price list on standard steel taper pins has been prepared by the John Gillen Co., Inc., 2542 S. 50th Ave., Cicero 50, Ill. A table of drill sizes for taper pins is included.

**Steel Foreman's Desks.** A two-color bulletin (Form 721) released by the Standard Pressed Steel Co., Jenkintown 22, Pa., covers a line of steel foreman's desks of sturdy, all-steel construction with smooth, firm writing surfaces. Information on special desks to meet individual requirements is also included.

**Ground Flat Stock.** A 16-page three-color folder published by the Brown & Sharpe Mfg. Co., Providence 1, R. I., describes and illustrates ground flat stock which is available in three types—combination oil or water hardening, oil hardening, and water hardening—for test tools, die work, jigs, fixtures, parallels, punch dies, flat gages, snap gages, templates, stamps and cutters, test gages, and machine parts. The folder also contains specification and temperature charts.

**Gages.** A 36-page catalog issued by The Cadillac Gage Co., 20316 Hoover Rd., Detroit 5, Mich., covers a complete line of gages, including thread plug and ring gages, concentricity gages, pipe thread gages, reversible cylindrical plug gages, Pla-Chek gages, special toolmakers' gages, adjustable snap gages, and so on. The catalog not only illustrates all of the gages manufactured by the company but contains charts showing the many various sizes available as standard. Of particular interest is a section containing charts on Unified and American Standard Screw Threads, Thread Gage Forms, Dimensional Constants, Gage Tolerances, and so on.

**Induction Heating Unit.** Bulletin No. T-1430 published by Lindberg Engineering Co., 2469 W. Hubbard St., Chicago 12, Ill., describes and illustrates the Lindberg LI-10 Induction Heating Unit which is said to be capable of providing more than 10 kilowatts (continuous) at 450,000 cycles per second and can be used in a wide variety of metal heat treating and fabricating operations. Information on features, applications, operation, work-handling equipment, and specifications is included.

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31 to 40	5 1/4	.60
41 to 50	4 1/2	.50
51 to 60	4 1/4	.40

Size Inches	Length Overall Inches	Length Flute Inches	Price Each Net
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27/64	12	9	3.00
7/16	12	9	3.00
29/64	12	9	3.25
15/32	12	9	3.25
31/64	12	9	3.25
1/2	12	9	3.25

#### Straight Shank

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9/64	12	9	1.50
5/32	12	9	1.50
11/64	12	9	1.50
3/16	12	9	1.50
13/64	12	9	1.60
7/32	12	9	1.60
15/64	12	9	1.75
1/4	12	9	1.75
17/64	12	9	1.85
9/32	12	9	1.85
19/64	12	9	2.00
5/16	12	9	2.00
21/64	12	9	2.25
11/32	12	9	2.25
23/64	12	9	2.50
3/8	12	9	2.50
25/64	12	9	\$2.75

#### Taper Shank

17/32	15	12	6.50
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19/32	15	12	7.50
5/8	15	12	8.00
21/32	15	12	8.00
11/16	15	12	8.25
23/32	15	12	8.50
3/4	15	12	8.50
25/32	15	12	9.50
13/16	15	12	11.00
27/32	15	12	11.50
7/8	15	12	12.00
29/32	15	12	12.50
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31/32	15	12	14.00
1	20	15	16.00
1-1/16	20	15	17.00
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## VICTOR MACHINERY EXCHANGE, Inc.

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**Safety Feeder.** A four-page two-color circular prepared by the F. J. Littell Machine Co., 4163 N. Ravenswood Ave., Chicago 13, Ill., describes a device, known as the "Pres-Vac" for the safe hand feeding of small parts into a press.

"Stampings in Small Lots" is the title of a 16-page bulletin published by Dayton Rogers Mfg. Co., 2824 13th Ave. S., Minneapolis 7, Minn., which describes and illustrates a design and construction of tooling and equipment for producing die-cut stampings in limited quantities on an economical basis.

**Cylinder Wheel Holder.** A four-page bulletin (No. 278) published by The Blanchard Machine Co., 64 State St., Cambridge 39, Mass., describes and illustrates a holder for cylinder grinding wheels which is available for Blanchard Nos. 11 and 18 surface grinders.

**Chisels.** A four-page two-color illustrated bulletin (No. 2 SK) published by the Delaware Tool Steel Corp., Wilmington, Del., provides specifications and prices of a magnetic-particle inspected line of chisels for hand, pneumatic, and electric hammer use.

"File Philosophy." A new edition of the booklet "File Philosophy," which is especially designed to aid file users in properly selecting, using, and caring for their files, has been published by the Nicholson File Co., 48 Acorn St., Providence 1, R. I. The 48-page booklet is profusely illustrated and simply written.

Contents of the booklet are as follows: King Saul Knew about Files (A bit of file history); How a Quality File Is Born; A

File for Every Purpose; Mill Files (Saw Files); Machinists' Files; Rasps; Swiss Pattern Files; Curved Tooth Files; File Terminology; How to Get the Most Out of Files; Use the Right File for the Job; Use the Right Filing Method Too; Draw-filing; Lathe Filing; "Know Your Files and Get Ahead!"; Special Purpose Files; Filing Rough Castings; Filing Die Castings; Filing Stainless Steel; Filing Aluminum; Filing Brass; Filing Lead; Smooth Finishing on Soft Metals; Filing Plastics; Precision Filing; The Care of Files; Saw Files and Saw Filing; Sharpening Tools and Implements.

**Inside Micrometers.** A four-page bulletin (No. R-3) published by the Rinat Machine Tool Co., 1115 Air Way, Glendale 1, Calif., describes and illustrates inside micrometers for measuring snap ring grooves, "O" ring grooves, large bores, deep bores, and small bores. Construction features are discussed and dimensions of standard models are listed.

**Flexible Shaft Machines.** An eight-page two-color catalog (No. 170) published by the Foredom Electric Co., 27 Park Place, New York 1, N. Y., describes and illustrates its line of flexible shaft machines designed particularly for use on small irregularly-shaped parts. Information on handpieces, attachments, and accessories are included.

**Hydraulic Diamond Turner.** An illustrated bulletin released by the Cleveland Industrial Tool Corp., 1080 E. 222nd St., Cleveland 17, Ohio, features the Citeo Hydraulic Diamond Turner for grinding wheels which is said to be adjustable to three ranges of degrees and capable of automatically splitting the segment on the diamond face at the completion of each turning cycle, thereby maintaining a new and ever-ready cutting edge throughout the life of the diamond.

**Heavy-Duty Power Tools.** A 36-page two-color Catalog A describing and illustrating heavy-duty power tools for metal and other materials has been published by the Walker-Turner Division, Kearney & Trecker Corp., Plainfield, N. J. Complete specifications and operating conditions are presented for all machines, which include band saws, radial saws, tilting arbor saws, drill presses, jointers, lathes, shapers, air feeds, surfacers, and flexible shaft machines.

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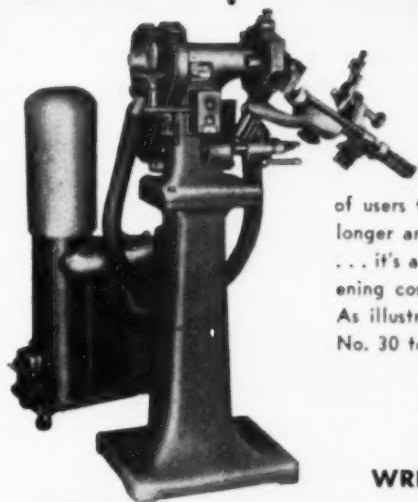
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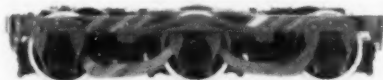
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**"Diesel Engines—Fuels and Lubricants"** is the title of a 48-page attractive booklet published by the Sinclair Refining Co., 630 Fifth Ave., New York 20, N. Y., which discusses the rapidly expanding use of Diesel engines in modern transportation equipment, industrial applications, and so on, and the importance of proper fuel oil and lubricating oil in effecting satisfactory Diesel operation.

**Power Presses.** A 28-page illustrated bulletin released by the Zeh & Hahne-mann Co., 190 Vanderpool St., Newark 5, N. J., describes reclining, open-back gap-frame, punching, straight-side single crank, double crank, and patent percussion power presses. Specifications for each type press are included.

**Tapping Attachment.** A two-color illustrated bulletin (No. F50) descriptive of the Proconier "Tap King" Model 4F Tapping Attachment with capacity for tapping holes from  $\frac{3}{8}$  to 1 inch in steel has been issued by the Proconier Safety Chuck Co., 12 S. Clinton St., Chicago 6, Ill. New features and advantages of the attachment are covered.



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division of J. A. Fay & Egan Co.  
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**Binocular Magnifier.** A four-page two-color folder published by Edroy Products Co., 480 Lexington Ave., New York 17, N. Y., describes and illustrates the "Magni-Focuser," a binocular magnifier which can be used on all "close" and precise operations with ease. Specifications and list prices are included.

**Bandsaw Tire.** A four-page two-color bulletin published by Carter Products Co., 959 Michigan Trust Bldg., Grand Rapids 2, Mich., describes and illustrates its "Jiffy-Tire" which is made in sizes to fit any bandsaw wheel from 12 to 38 inches in diameter. Information on installation is included.

**Selector Switch Control.** An eight-page illustrated engineering data folder complete with target sheet to aid electrical engineers in understanding and applying the A-H Push-Pull-Selector Switch has been released by the Arrow-Hart & Hegeman Electric Co., 1304 Hawthorne St., Hartford 6, Conn. The folder features detailed data on the construction and typical applications of the switch which provides a single point of control for a multiple-operation machine.

# WHERE TO GET IT

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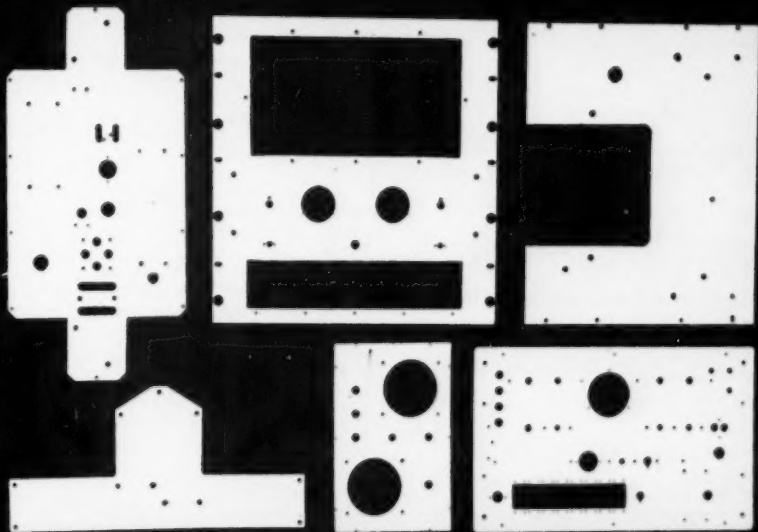
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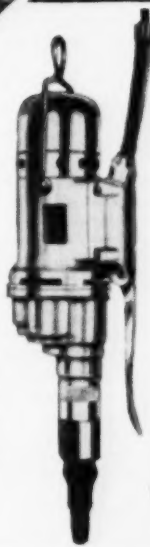


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## Over The Editor's Desk

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### Quotes and Comments

"The Taft-Hartley law has made it impossible for workers to gain the benefits and protection of labor unions. Membership in organized labor unions, which totalled about 15,750,000 when the Taft-Hartley measure was passed has declined today to about 15,500,000. There has been an actual decline in union membership because of Taft-Hartley."

—Secretary of Labor Maurice J. Tobin.

During 1947 and '48, union membership—under the Taft-Hartley law—increased from 14,790,000 to 15,700,000. If it has declined since, it is very evident that it is because American workers are losing faith in John L. Lewis, Walter Reuther, and other labor leaders whose bad judgment has cost these workers many millions of dollars in wages. Lewis's bull-headed tactics have cost thousands of miners their jobs—permanently.

"Last year we produced nearly one billion two hundred million bushels of wheat. January 1 we had a carry-over of 390,000,000 bushels. Does anybody have any idea what we can do about it? We don't use but 700,000,000 bushels. We will wind up this year with a surplus of 500,000,000 bushels.

"Another good crop is cotton. We have a supply of 21,000,000 bales and we use only 8,000,000 bales in this country. Through ECA we hope to export 5,000,000 bales and have a carry-over on August 1 of 8,000,000 bales. There is (also) a peanut surplus of over 300,000 tons."

—Hon. George M. Grant, of Alabama.

The Department of Agriculture bought 367,000,000 pounds of shelled peanuts last year and 74,000,000 pounds of unshelled. It appears to be preparing to buy even more this year. The government paid \$62,864,000 for these peanuts. Besides that, the government paid \$225,000,000 to the growers—and that isn't peanuts.

All of these surpluses were paid for by the government at top market prices with money extracted from the American people in the form of taxes. The salable part of these crops was purchased by American housewives at prices that had been forced to a high point by the government's action in removing the surpluses from the market. Thus the citizen had to pay twice, and at unreasonably high prices both times.

"The best overall measure of a nation's economy is its annual output of goods and services. In the United States the annual output of goods and services increased in the last ten years about 60 per cent."

—Harry Truman.

Five of these years were devoted almost exclusively to war production and the other five years have been devoted to a desperate effort to catch up with the nation's needs as a result of the five years of no consumer goods production. A large part of this production increase has been achieved by improved industrial methods for which, apparently, Truman thinks he should have credit.

---

"The truth is that the annual per capita income of our citizens, after taxes, has increased in the last ten years by more than 40 per cent."

—Harry Truman.

During these ten years the government's policy of inflation—thanks to Harry's program for buying support—has depreciated the currency by nearly 50 per cent; thus the annual income, including the 40 per cent increase, amounts to less in buying power than it did ten years ago.

---

"The Federal budget in 1928 was \$4,000,000,000. By 1938 it was \$8,000,000,000. By 1948 it was \$40,000,000,000.

"In 1928 we had 400 Federal agencies in the budget. In 1938 we had 1,000. Today we have 1,800 Federal units in government.

"In 1928 there were 500,000 Federal employees in all departments. By 1938 we had a million civil employees. By 1948 we had a few more than two million, not counting any military personnel.

"In 1928 the per capita debt was \$146. In 1938 it was \$286. And in 1948 it was \$1,759. The Federal debt today is an unseen mortgage of a little more than \$7,000 on every family in America.

"High, wide and handsome is the spending today. The spenders have mortgaged the lives, not only of your children and your grandchildren, but of their grandchildren for generations almost unnumbered."

—Hon. Edward Martin, of Pennsylvania.

In the end, in a desperate attempt to stave off collapse, the government will resort to inflation of the currency, under which the value of the pensions that the unions are clamoring for, government pensions, annuities, life insurance, and all other forms of savings will be wiped out. The people will lose confidence in the government completely and chaos and confusion will be the order of the day. Under such conditions it will be an easy matter for a strong Socialist leader to set up a totalitarian state, because the people will then turn to any leader who can reestablish order. And Socialist "order" will mean complete regimentation and subservience to government.

Don't think "it can't happen here." It can—and we are fast moving in that direction.

*Howard Campbell*



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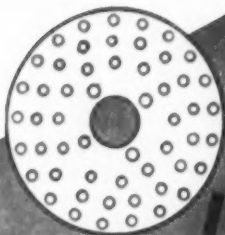
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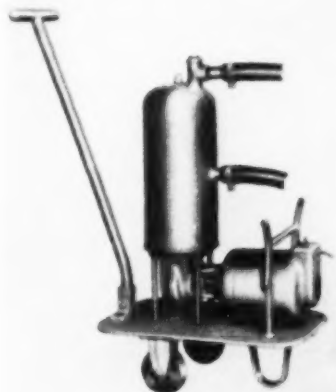
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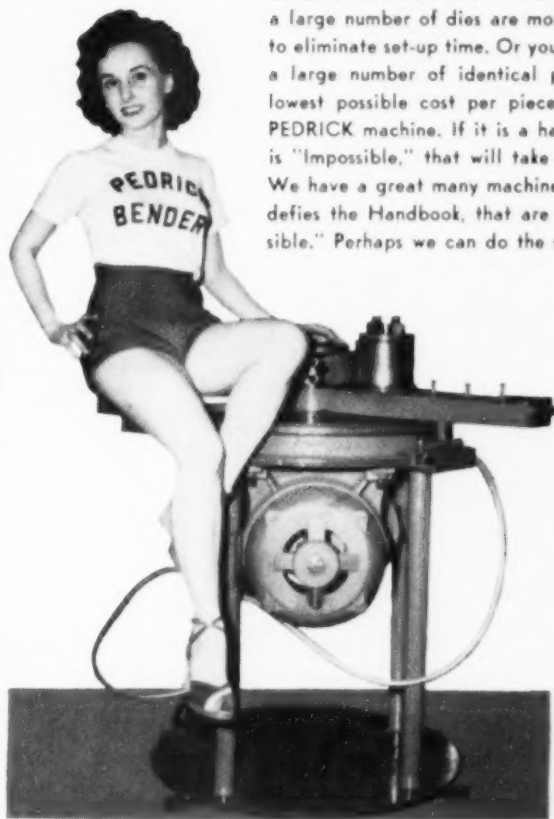
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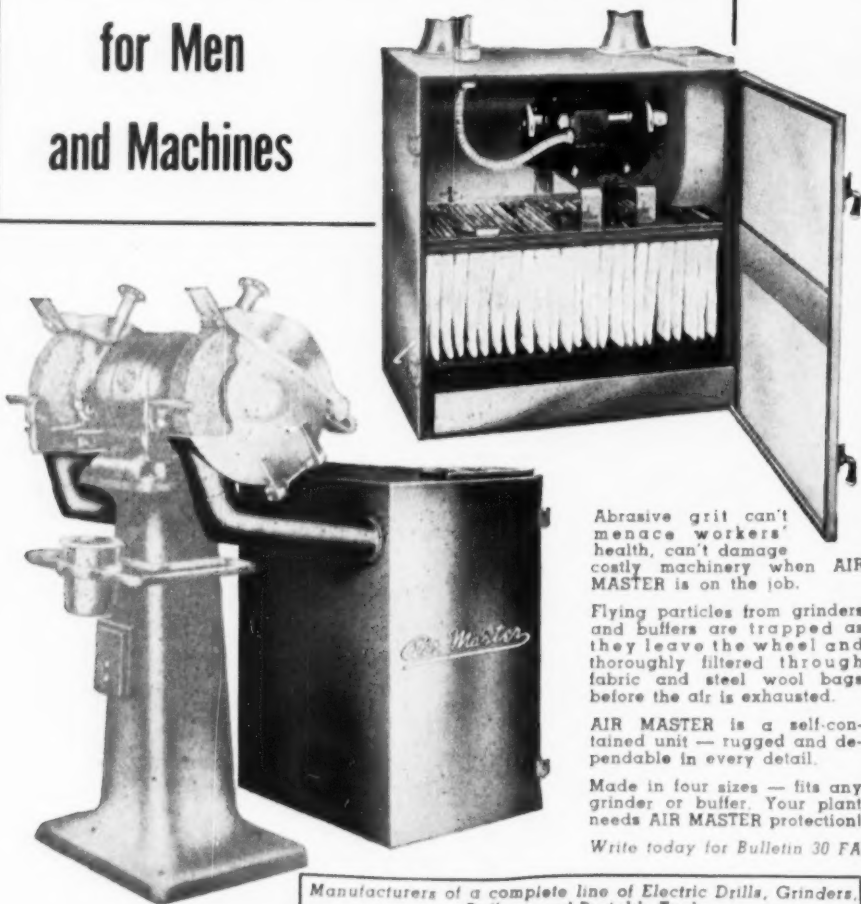
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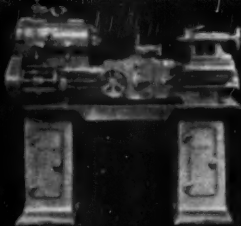
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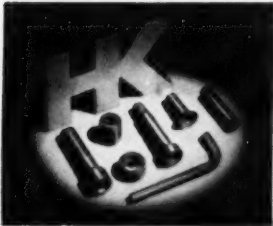


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